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THE MEDICAL AND SURGICAL ASPECTS OF GANGRENE OF THE LUNG.[1]

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On taking charge of the men's medical ward, a few weeks ago, I found among the patients one who, on May 10th, was admitted to the ward by my colleague, Dr. Morris J. Lewis. He was an Austrian, aged forty-two years, who had been ill for four months with cough and profuse expectoration. As far as could be learned the family history was negative, and he himself had always been well until the onset of his present illness. At the time of the beginning of his attack he was working in the coal mines. His illness began with fever, occasional chills, cough, expectoration, and pain in the right side of the chest. He was under treatment in a hospital at Pittsburg from two weeks after the beginning of his illness until three weeks before his admission to this hospital. On his admission his complaint was of cough, profuse expectoration, considerable pain in the right side of the chest, and aggravation of the cough when turning on the left side. Examination at the time of his admission showed him to be a swarthy, well-nourished man. Examination of the chest revealed nothing abnormal about the heart, either in regard to its position, size, or sounds. Over the left lung there were a few sibilant râles near the apex, but otherwise nothing abnormal was found. On the right side there was impairment of the percussion-note below the third interspace, uninfluenced by position, while both anteriorly and posteriorly the breath-sounds at the lower portion of the

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lung were tubular in character and accompanied by mucous râles on both inspiration and expiration. The liver and spleen were normal, as also was the urine. The sputum was of greenish color and mucopurulent in character. Examination of the sputum showed the presence of many diplococci and streptococci, but no tubercle bacilli were found on repeated examinations. In the notes made after his admission there is frequent mention of the fact that the sputum was profuse and very offensive. The note of May 20th states that the patient's temperature had continuously remained at about the normal point, and that there was but little change in the physical signs since his admission. Some change in these signs was noted on May 25th, it being stated that the percussion-note was flat laterally and posteriorly over the lower portion of the right chest, with absent fremitus over this area and with increased fremitus above, while the respiratory sounds were noted as being tubular, with a decided amphoric echo. By degrees the sputum became less abundant, and his general condition improved. Just before his discharge, on August 13th of this year, examination of the blood showed that the red cells numbered 4,630,000, the hæmoglobin was 82.5 per cent. of the normal, and the leucocytes were 11,000 per cubic millimetre. Five days after his discharge he was readmitted. For the first time there is then found the note that there was clubbing of the fingers.

The case ran an uneventful course, with almost complete absence of temperature and but little change in the general or local conditions until lately (September 12th), when he began to have irregular rises of temperature. Shortly after this time he began to expectorate small clots of blood, which at times tinged the sputum quite decidedly. Repeated examination again showed the absence of tubercle bacilli, of elastic tissue, and of fatty-acid crystals. On September 19th the notes state that distinct myoidema was present on both sides of the chest, and that examination of the anterior surface of the chest showed no new development except for the presence of a distinct friction-rub in the neighborhood of the right nipple. Posteriorly, on this date, examination of the right side showed dulness amounting almost to flatness from the level of the fourth thoracic spine downward, with cavernous breathing and numerous moist coarse râles over the upper portion of the dull area, while over the lower portion thereof the breath-sounds were almost amphoric. He was at that time still expectorating large quantities of fetid, greenish, mucopurulent material. This was most abundant in the morning, although on change of position cough was intensified and large quantities of mucopurulent material would be discharged. On September 25 he suddenly expectorated about a pint of blood. Examination yesterday (October 5th) gave the following results: He looked quite ill; the cheeks were sunken and the forehead covered with beads of perspiration. There was no cyanosis except of the nails;

the ends of the fingers and thumbs and of the toes were very markedly clubbed. The chest was quite barrel-shaped and showed some apparent diminution in size at the right base. The apex-beat was in the normal position, but the normal area of cardiac dulness was almost entirely covered by hyperresonant left lung. While the heart-sounds could be heard, they were extremely distant, a fact that was accounted for by compensatory emphysema of the left lung. The existence of the latter was shown by marked hyperresonance, with blowing breathing and prolonged expiration over the whole left chest. On the right side hyperresonance was also present over the upper portion of the lung, where the same character of the breath-sounds was noted, with the addition of coarse crackles on inspiration. Below the third rib anteriorly on the right side there was decided dulness, with very distant breath-sounds, and the lower interspaces on the right side, both anteriorly and laterally, were decidedly retracted. Posteriorly the left chest showed nothing except the signs of emphysema. On the right side was marked dulness, with great increase of resistance to the percussed finger over the right lung from the level of the sixth dorsal vertebra downward. Over this area the breath-sounds were loudly cavernous and accompanied by very many metallic râles. Whispering pectoriloquy was very distinct. These abnormal sounds were most marked and seemed nearest the ear at the level of the ninth dorsal vertebra, 6 cm. from the median line.

I need only add to what I have said in regard to the course of this case while in the medical ward, that from the 13th of September until the time he was transferred to the surgical side of the house his temperature never remained at the normal point for any consecutive length of time. After the date mentioned it became quite irregular, at times running up to 103° F. or more, but never remaining at that point for long. The chart thereafter shows irregular elevations and depressions, abruptly replacing the almost continuously normal temperature shown before September 13th. I would again emphasize the fact that at no time throughout his stay in the hospital were there found tubercle bacilli, elastic tissue, or fatty-acid crystals.

We have here, then, a man who has been ill for about eight months with an affection characterized by cough and profuse expectoration. Let us first occupy ourselves with the data given by the history of his illness in regard to their bearing upon the nature of his trouble.

In the family history there is no ascertainable fact having a bearing upon his illness. The patient's lack of understanding of the English language, and the general ignorance among this class in regard to the fate of other members of the family, makes this apparent absence of inherited disease tendency an unimportant factor in determining our diagnosis.

In his past history all inquiries are negative save for the fact that his occupation has been that of a coal-miner. This suggests to the mind several factors that may have a bearing upon the case. Workers in coal mines, like those engaged in such occupations as knife-grinding and stonecutting, are subject to influences of so harmful a nature that all of those who have been exposed to them for a prolonged time have structural alterations in the respiratory apparatus of greater or less importance. In the coal-miner, or in the case of a man who has worked where coal-dust abounds, the lungs are of an almost uniform black color, while the bronchial glands are similarly altered from the normal as regards their color. These changes in color are due to the presence within the cells of the pulmonary and glandular parenchyma of carbon particles. Large particles of coal-dust, when carried into the air-passages, cause irritation of the sensory nerve endings and reflex cough, which causes their expulsion. Smaller particles, with which the air of the coal-mine is charged, are carried into the true pulmonary tissue, where they infiltrate the fixed cells or are engulfed by the phagocytic leucocytes and carried to the bronchial glands, in which they are retained mechanically by the admirable filtration apparatus of these structures. The continued entrance or presence of foreign materials into any tissue causes irritation of the latter, with consequent connective-tissue formation even in the absence of bacterial contamination. In the lung this increase of connective tissue beyond that normally present causes thickening of the walls of the bronchi and of the pulmonary septa, interfering with the perfect expansion and elastic retraction of the infundibula and alveoli, and weakening of the wall of the bronchi, whose normal coats are more resistant to pressure than are those thickened by cells resembling those of scar-tissue. The prevailing tendency of pathological connective tissue is contraction. In the interstitial tissue of the lung the chief result of this contraction is the interference with the proper vascular (sanguinary and lymphatic) circulation, and the same outcome is present in the bronchial walls. At first sight, interstitial inflammation and contraction of the resulting fibrous tissue would seem to presuppose narrowing of the air-tubes. Such, however, is not the result. Because of the interstitial inflammation of the walls of the bronchioles, the nutrition of these suffer and their strength is naturally impaired. The newly-formed connective tissue lying between the air-tubes in retracting tends to cause the approximation of the bronchioles. This, joined to the weakened condition of the walls of the latter, makes their dilatation a natural outcome of such interstitial inflammation of the lung. Dilatation of the air-tubes means the formation of pockets and reservoirs wherein secretion accumulates and is retained for a time sufficient to allow fermentative and putrefactive changes to occur, with resulting ulceration and progressively increasing

reactive inflammation—a typical illustration of the "vicious circle" so frequently seen in the processes of disease. Such, then, is the possible picture of the lung of one working in a coal-mine.

It might be well here to still further pursue this subject of the coal-miner's lung before proceeding with the history of the case before us. While encapsulation of foreign bodies by connective-tissue formation is a beautiful illustration of the natural methods of protection, this newly-formed connective tissue lessens the resisting power of the organ involved, partly by the disturbance of proper nutritive supply, by involvement of the blood-supply and lymphatic drainage of the part. Infection of such a thickened lung can, therefore, be supposed to be more serious than would that of an organ with normal circulation. The choking of the bronchial lymphatic glands with carbon particles and newly-formed connective-tissue cells would seem to be also a factor that should be considered in thinking of pulmonary infections among coal-miners. In chronic interstitial pneumonia, from whatever cause arising, there is a remarkable tendency to pleural thickening and formation of pleural adhesions. These may still further complicate the picture by the addition of infective accidents to the pleura, the functions and self-protective processes of which must be obstructed by such alterations.

To return to our patient. Four months before his admission he began to feel ill. His first symptoms were fever, with occasional chills, cough, expectoration, and pain in the right side. Bearing in mind the fact that his lungs were probably already in, at least to some extent, the condition of thickening and mild chronic interstitial inflammation present in all workers in coal-mines, what possible accidents may have occurred at that time to cause his acute symptoms? The facts obtainable are too few to permit of our drawing any absolute conclusions, but some clues may thus be obtained, the pursuance of which may help us to arrive at a correct diagnosis of his present condition.

An acute attack of bronchial inflammation would account for his fever, chills, cough, and expectoration. It would not explain the pain in the right side unless we also suppose that he had a coincident infective pleurisy, or possibly a pleural irritation caused by rupture of an old pleural adhesion in the act of coughing. The former of these is somewhat unlikely; the latter is rather far-fetched. An acute attack of pleurisy would be accompanied by all of his symptoms except expectoration. All miners have a chronic cough, due to irritation and inflammation of the bronchial mucous membrane; but the patient speaks as though the cough—marking, with other symptoms, the onset of his illness—were quite severe and accompanied by an increased amount of expectoration. It is probable, therefore, that there was an area of pneumonic consolidation with concomitant pleurisy somewhere in his lower right lung. This would best account for the symptoms present

at the outset of his illness and likewise for the prolonged stay in the hospital, the slowness of resolution being accounted for by a chronic interstitial change in the pulmonary tissue and the lymphatic apparatus of the lungs. In fact, the man has never recovered from this acute illness, and at the present time, now almost nine months therefrom, he is a seriously ill man.

One other point is mentioned by him in his meagre account of his illness. He has volunteered the statement that change of posture aggravates his cough. Such a statement has a quite important bearing upon the case. The easiest explanation of the production of cough upon change of posture is that on changing the position of the body some irritating material is shifted from a location where its presence is not resented to one where irritation is produced. Such conditions are presented by cases of bronchial dilatation. The saccular dilatation of a bronchus shows a mucous membrane destroyed or attenuated, with possibly fairly normal mucous membrane on either side of it. The acrid and irritating material filling such a sacculated dilatation may produce no outward sign of irritation, owing to destruction of the peripheral ends of the afferent nerve of the reflex arc concerned in coughing; but if the position of the body be changed this irritating acrid or putrescent collection flows by gravity out of the cavity and comes in contact with a mucous surface in a position to protect itself by reflex cough. So characteristic is this excitation of cough by change of posture that bronchial dilatation should be at once taken into consideration upon its presence being determined.

What bearing may this bronchial dilatation have upon the etiology of the acute illness affecting our patient? A frequent form of pneumonia is that due to the inhalation of foreign bodies, such as particles of food (called by the Germans "schluckpneumonie"). Ordinarily such particles are expelled from the air-passages at once through the spasmodic cough excited by their contact with the mucous membrane of the larynx or trachea. In certain conditions, such as in profound ether or chloroform narcosis, and in low states to which we apply the term "typhoid" as expressive, the reflex excitability of the mucous membrane of the air-passages is diminished or abolished, and particles of foreign material (food, blood-clots, etc.) gain their way to the deeper respiratory tissues. If our patient has dilated bronchi (and such patients may frequently consider themselves well and perform their daily labors), may we not have an explanation of his acute pulmonary illness in the entrance into the lung tissue proper of material from a dilatation of the bronchus? Such material is of a character to set up violent inflammation, as can be judged from its appearance and odor, even without a chemical or bacteriological examination.

The duration of his illness may be due to the persistence of a pneu-

monic consolidation or to a localized pleural effusion of irritating character.

I think that we have now run out our clues furnished by the history of our patient. Our diagnosis cannot be established on the facts given. Physical examination of the chest is our next resort. By this means we shall endeavor to determine as nearly as may be the physical conditions present, and especially that of the thoracic organs. In the first place, as you see, the man is emaciated, with hollow cheeks and sunken eyes. This throws no light upon the diagnosis, as any of the possible causes of his illness might be accompanied by loss of flesh. On examining his extremities a striking peculiarity is at once seen, and must be visible even to those sitting at a distance. The fingers and toes show a peculiar clubbing of their ends, making them resemble drumsticks as a whole, while the last joints have the appearance well likened to the beak of a paroquet. The nails show increase in their natural curvature, not only from side to side but also and especially from base to edge. In addition to this the soft parts of the last joint seem to be increased in bulk both at the sides of the nail and in the pad on the palmar and plantar surfaces. Just behind the nails the skin is thickened, forming a quite prominent crescentic ridge. In addition, those of you who are near at hand can see that the nails, instead of being a rosy pink color, are almost lilac in color, although there is no general cyanosis. We see here a typical example of "clubbing" of the fingers. This curious alteration in nutrition of the very remotest portions of the body is seen in a number of conditions, but is not thoroughly understood, in spite of the fact that a considerable amount of attention has been paid to it, especially since Marie particularly described this, with other tissue changes in the extremities, under the name of "osteo-arthropathie hypertrophiante pneumique." This nutritional change in the extremities has been occasionally observed in cases of hepatic cirrhosis; but, save for this rare association, it is seen only in certain diseases of the thoracic contents. These are congenital heart disease of certain kinds, long-standing pulmonary tuberculosis, with cavity formation, bronchiectasis, and chronic empyema. It is seen most typically in serious congenital heart lesions, such as patency of the ductus arteriosus with deficiency of the septa, and in empyema in children. It is seen most frequently in pulmonary tuberculosis. While an interesting feature, it throws but little light upon the diagnosis of our case.

Examination of the thorax shows interesting alterations. Superficially, we find a sign to which, at one time, too much importance was attached, chiefly because it was pronounced a valuable sign of pulmonary tuberculosis. This statement was made by no less an authority than Lawson Tait, whose field of usefulness, however, lay more in

gynecology than in phthisiology. The sign to which I refer is that known as myoidema. On striking the skin over any resisting tissue, such as the ribs, clavicle, or scapulæ, there is seen a sharp reflex movement of the skin. This takes two forms—one local or occurring immediately beneath the point of contact of the finger, the other more widely extended and running in both directions from the area struck. To the first of these is applied the term nodular, to the second, fibrillary myoidema. The latter consists of a wave-like contraction, which may be seen in marked instances to travel for many inches to either side of the point of impact, and may be repeated two or three times upon one application of the stimulus, running backward and forward to and from this point. The nodular form consists in a visible and palpable elevation of about the size of a pea. This arises at once on removal of the finger. If watched, the elevation may later be seen to travel backward and forward for a short distance along the same line as that pursued by the fibrillary contraction. In some cases this movable elevation is evidently not the same as that first appearing after the blow, but is apparently due to a meeting of two, so to speak, contraction-waves running in opposite directions. The phenomenon is evidently not the result of œdema or of changes in the vasomotor condition of the skin irritated, but is the result of reflexly excited contraction of the evolutionary remains of the platysma myoides muscle, which in man is grossly seen only in the neck and extreme upper portion of the thorax, but which is more extensively developed, or rather better preserved, in some of the lower animals, allowing, for example, the horse to move the skin of portions of the body in order to free itself from the presence of insects. Why this excessive reflex irritability should be present has never been satisfactorily determined. It possibly has some relation to toxin absorption, as it is as marked in the later stages of typhoid fever as it is in pulmonary tuberculosis. It is seen also in exophthalmic goitre, that epitome of curious phenomena, and in cases of extensive arterio-sclerosis. In most of these conditions there is more or less diminution in the amount of subcutaneous fat, a probable explanation of the vigor of the reflex result arising from sudden compression of the superficial tissues between the skin and the firm underlying bone. The cause and nature of this sign is one of the many questions worthy of careful study. This sign, while interesting, has but little weight in reaching a diagnosis in our case. Leaving this side-issue to return to the further examination of our patient's chest, we find a marked disparity on the two sides. The chest as a whole has, as you see, the circular shape which has caused the name of barrel-shaped to be applied to the type. The antero-posterior diameter is increased, the costo-sternal angle forms almost a straight line instead of a right angle, the scapulæ lie far more toward the lateral regions of the chest, and there

is marked forward curvature of the upper dorsal and lower cervical portions of the spinal column. Such a "barrel-shaped" chest is frequently seen among coal-miners, because of the prevalence among them of pulmonary emphysema. This change in the lungs is one of the many secondary results of the chronic fibroid inflammation produced by the prolonged inhalation of carbon particles. The elasticity of the lungs is impaired and the expiration collapse is rendered less complete, while their nutrition is decidedly impaired, with resulting structural weakness. To this cause for emphysema we have added bronchial catarrh, a very frequent precursor of emphysema. The limitation of the respiratory excursion of the chest as a whole is plainly seen to be more pronounced upon the right than upon the left side, at the right base more than at the right apex. Percussion shows over the whole left half of the chest, and over the right side down to the lower border of the third rib, a note more ample than is that obtained by percussing over a healthy lung; while over the same areas the breath-sounds are decidedly "blowing" and the expiratory sound is greatly prolonged. Evidently, therefore, the left lung and the upper portion of the right are emphysematous, but physical examination fails to tell us whether this condition antedated or was wholly or in part due to the illness which laid him low. The enlargement of his left lung prevents accurate determination of the area of cardiac dulness, but palpation detects a faint apparent apex-beat in the normal position, a point that is of considerable importance in further elaborating our differential diagnosis.

Turning now to the examination of the lower portion of the right side of the thorax we find evidences of trouble sufficient to account for the prolonged and serious illness. More careful examination of this portion of the chest shows decided retraction of the interspaces both anteriorly and laterally. Below the third rib there is decided dulness, with increase in resistance to the percussed finger, diminution of tactile fremitus, and very distant and feeble breath-sounds. The upper line of this area of dulness does not shift on change of posture—the material separating lung tissue from chest wall is not freely movable. Posteriorly the left side again shows the signs of emphysema, with at times mucous râles. On the right side, from the level of the sixth dorsal spine downward, there are dulness, great increase of resistance, loud cavernous breathing, metallic râles, and whispering pectoriloquy. The cavernous breathing and whispering pectoriloquy are most distinct and apparently nearest to the ear at the level of the ninth dorsal vertebra, 6 cm. to the right of the median line.

We have these additional clues furnished by physical examination: There is no evidence of active disease in the left lung or upper lobe of the right lung. There is something separating the lower portion of the

right lung from the anterior chest wall. This material is not air, and, if fluid, it is limited by adhesions. The interspaces of the lower right chest are retracted, showing that the material separating the lung and chest wall occupies less space than did the healthy lung, which would not be the case with pleural effusion or pure tumor formation. Mere retraction of the lung would cause sinking of the interspaces, but would not give us such impairment of resonance or feebleness of breath-sounds. Thickening of the pleura, with contraction of the newly-formed fibrous tissue, would account for all of the signs present on the front of the chest except for the normal position of the apparent apex-beat. The absence of dislocation of the heart should not, however, be allowed much weight, although it is worth noting. Posteriorly on the right side we have distinct signs of the formation of a cavity, with surrounding tissue condensed and airless. Is this cavity in the lung, or is it outside of that organ, but in communication with the air-passages? In favor of its being in the lung is the distinctness of the pectoriloquy as compared with the amphoric character of the breath-sounds, but especially are we aided in making the distinction by the absence of the peculiar bell-like sound conveyed to the applied ear when coins are struck together on the chest wall. If in the lung, is the cavity due to dilatation of a bronchus or to a destructive process involving the parenchyma of the lung? This question is one often presenting much difficulty in its solution, and one at times impossible to determine by physical examination alone. There are two facts weighing against the view that this is a bronchiectatic cavity. In the first place, the area showing signs of cavity is considerably larger than is that produced by a dilatation of a bronchus, and the extreme base is a rather unusual site for such a dilatation. Abscess of the lung might also give rise to just such signs as are present here, and must be considered in making our diagnosis.

Physical examination shows us merely the changes from the normal in the actual condition of the lungs and air-passages. It can do no more. To determine to what these changes are due we can call to our aid the past history of the illness and certain laboratory methods in order to determine the cause of these alterations in structure. The former of these we have considered somewhat, the latter we shall now consider. Throughout the patient's stay in the hospital, and from the beginning of his illness, expectoration has been a prominent feature. We can obtain from him no history as to the character of the sputum at the onset, and we are unable to state whether at the beginning its character was such as to indicate the nature of the early pulmonary lesion. Had we obtained the statement that at first the sputum was scanty, viscid, and of a rusty color, our thought would naturally be that the whole trouble might have followed an acute croupous pneumonia. Our most

careful inquiries only develop the fact that expectoration was a marked feature from the outset. Since his coming under observation the sputum has been abundant, nummular, with considerable fluid, of a brownish color, and for a long time of a very offensive odor. The quantity of the sputum indicates but very little that is significant. Any lesion involving a large extent of respiratory surface would give abundant expectoration. A chronic bronchitis, a large bronchiectatic cavity or cavities, an area of pulmonary excavation from any cause, or a long-standing pulmonary congestion would be accompanied by profuse expectoration. The curious coin-like masses of more viscid material, giving rise to the descriptive term "nummular," are seen most typically in the sputum of a tuberculous cavity, but similar characteristics are present in the absence of tuberculosis, and the "sputa cocta et fundem petenta" does not, as was at one time thought, point necessarily to pulmonary cavitation. The large amount of fluid present gives us no distinct clue, although the expectoration is known to be quite fluid in cases of œdema of the lung and in pulmonary gangrene. The odor of the sputum here has been for a long time extremely offensive; not the mawkish sweet odor present so frequently in cases of tuberculous breaking down and in abscess of the lung, but of an acrid, putrescent quality. This characteristic of the sputum is seen in two conditions—bronchiectasis and pulmonary gangrene. In neither of these conditions is there usually a pyogenic wall of granulation tissue, pouring out and covered by pus, but the material contained in the more or less "naked" cavities is less purulent and more serous in nature. The typical sputum of pulmonary gangrene is abundant, watery, and of a dull green color. On standing this separates into three layers—an upper turbid, sometimes frothy layer; a middle thin, watery stratum; and a lower viscid, opaque green or brown layer containing débris of cells, hæmatoidin crystals, fat droplets, fungi, and often protozoon forms. The sputum coming from bronchiectatic cavities has much the same characters, but frequently shows under the microscope fragments of elastic tissue without alveolar arrangement. The absence of the latter from the expectoration furnished from a gangrenous focus has been explained by the presence therein of a peculiar ferment which dissolves the elastic tissue much in the same manner as does the pancreatic juice. In repeated examinations of the sputum in our case elastic tissue was never found, either with or without alveolar arrangement. This fact would point to gangrene of the lung rather than to tuberculous softening, abscess of the lung or bronchial dilatation as a cause of the signs of cavity. The sputum has never been observed by us to be of a sufficiently purulent character to suggest abscess of the lung.

The hæmoptysis that has occurred lately in our case has but little

significance in a diagnostic sense. In "fibroid disease of the lung" blood in the sputum is not infrequent, owing to the high tension in the pulmonary circulation brought about by the obstruction to the blood-current consequent upon the overgrowth of fibrous tissue which constricts or obliterates the smaller bloodvessels. In bronchiectasis hemorrhage occasionally occurs from ulceration of the walls of the cavity. In tuberculosis the hemorrhage may occur early from reactive overfulness of bloodvessels, or, later, from erosion of their walls. In gangrene of the lung hemorrhage is frequent, owing to involvement of the bloodvessels' walls in the destructive process. In the absence of evidence of tuberculosis the more profuse hemorrhage seen here on one occasion would point rather toward gangrene of the lung than toward bronchiectasis, although, as I have said, its significance is diminished by the probable presence of fibroid infiltration from inhalation of carbon particles. Abscess of the lung is seldom accompanied by expectoration of blood, probably because there is usually thrombosis and obliteration of the surrounding bloodvessels before the latter are exposed on the surface of the cavity.

Examination of the blood shows moderate anæmia and slight leucocytosis, the latter being far less than would be expected in pulmonary abscess.

With the evidence before us, what judgment can we render in regard to the condition of this man's right lung? A working hypothesis is: That the man had chronic fibroid change in the lung, with emphysema and possibly some degree of bronchiectasis, prior to the onset of his acute illness. Inhalation of fetid material from a bronchiectatic cavity may have had something to do with the setting up of an acute pneumonic and pleuritic process in the lower lobe of the right lung, necrosis of the consolidated area being aided no doubt by the impaired nutritive state of the indurated pulmonary tissue. The gangrenous process, once started, would be accompanied by increasing thickening of the pleura, which would still further add to the vulnerability of the underlying lung.

Gangrene of the lung occasionally follows acute croupous pneumonia. There is no positive evidence of the latter in our case. It is frequent in "fibroid lung." This we have good reason to suspect here. It is sometimes seen as a result of pressure of a thoracic aneurism. This lesion we cannot find in our case. It is not uncommon in diabetes mellitus, an etiological factor certainly not present in this instance. It is very frequent as a result of the inhaling of a foreign body, especially if the lung were previously impaired in its vitality. This cause we cannot exclude here, yet the absence of known accident of this kind should not too readily lead us to exclude this as an etiological factor. I well remember a case of gangrene of the lung occurring in this ward

when I was resident physician here in 1887. The young man in whom the lesion occurred could give us no help in arriving at a conclusion as to the cause of his pulmonary gangrene; but after finding *post-mortem* a twig of evergreen in the midst of the gangrenous area his friends remembered that at Christmas time, some four or five months before his death, he had "swallowed the wrong way" a bit of Christmas green which he was chewing.

What would be the probable outcome if our patient were left unaided? The patient has been steadily losing ground for some weeks. Pyrexia, loss of flesh and strength, and profuse sweats show the absorption of toxins in abundance. Unless some favorable changes should occur toxæmia will certainly kill him. Can nature help him? It is possible for natural processes to heal the lesion through reactive inflammation walling off the septic material by a capsule of fibrous tissue, disintegration and expulsion of the necrotic tissue, and gradual obliteration of the cavity. Is this a probability in our case? There is no evidence of such natural repair, and this lack of protective power in the lung may be due to previous fibroid induration impairing the resisting power of the tissues. Our patient is in grave danger of death from toxæmia before nature can bring about a cure. With such a focus in the body there is constant danger of infection of other fairly healthy portions of the lungs, of septic emboli being carried from the lung to the brain or other organs, of infection of the endocardium, and of profuse and fatal hæmoptysis.

What assistance can we render to nature? Our only hope lies in supporting the patient's strength by food, tonics, and stimulants, in order to increase his general vitality and that of all his tissues and in lessening the production of toxins. In spite of all our supporting measures the effect of the constant dose of toxin absorbed is not neutralized by our remedies, as is shown by the increasing adynamia. From remedies to lessen toxin production but little is to be hoped. Inhalations of antiseptic volatile materials reach but a short way down in the respiratory tract. The drugs, such as creosote, guaiacol carbonate, and oil of eucalyptus, which we have given him in the hope that when eliminated by the lungs they would act as antiseptics, have appeared to be of little use. After a fair trial of these methods we have come to the conclusion that assisting nature by the removal of the actively diseased area, or rather of the necrotic tissue, by means of the knife presented the only hope of cure. From physical examination we can decide the seat of the lesion with accuracy. Our reasons for thinking operative removal or establishing effective drainage possible will be stated by Dr. Le Conte, to whose care we now transfer our patient, fully realizing that the surgeon's work is rendered less certainly beneficial by the toxic condition which we have in vain endeavored to

combat up to the time when it has become clear that nature cannot bring relief with sufficient rapidity to save our patient's life

Dr. Packard has given you a very clear picture of the medical status of this patient, and it only remains for me to bring out the surgical characteristics which it is important for us to note and consider, and then to describe the operation as it is being performed.

You will remember that the patient's occupation has produced a chronic fibroid condition of the lungs; that months ago some acute trouble was superadded; and that resolution followed very slowly and imperfectly, ending in a chronic inflammatory process, with putrefactive changes. For weeks he has been under our observation and has received the best of medical care, yet his condition is slowly and progressively growing worse, and the symptoms of septic intoxication are becoming more and more pronounced. No further benefits are to be hoped for from medical treatment; therefore we have strongly urged the patient to undergo operation. His condition, as you have seen, is not a very favorable one for operation; but he has some chance of recovery if we remove the gangrenous tissue and drain the cavity, while if it is allowed to remain a fatal termination is almost certain to ensue.

From a surgical stand-point, what are the important points elicited in Dr. Packard's examination? First, that the gangrenous process is confined to one lung. When both lungs are involved surgical interference is hopeless and useless. Second, evidence that the disease is localized to one portion of the lung and that probably only one cavity exists. When gangrenous foci are multiple in one lung we can scarcely hope to drain them all unless they are confined to a single lobe, and operation would be useless unless all of them were reached. For the same reason, when multiple cavities exist they must be very close to each other and capable of forming one cavity when the intervening barriers are broken down by the surgeon's finger. To drain only one cavity when others exist would be useless surgery. Third, that the process is limited and circumscribed, and not diffused. We have evidence of this in the constant, never-changing physical signs and also in the long duration of the case. It would be very poor surgery to attempt any interference in a gangrenous lung before nature had raised a barrier and limited the disease—that is, before a line of demarcation or separation has formed.

It is essential that these three points be determined before operation is undertaken. There are three other points that are important, although not absolutely essential to a successful issue, but which will materially influence our operative technique and also our prognosis in the case, namely, the accurate localization of the diseased area, its depth in the lung tissue, and the adherence of the pleural surfaces.

Accurate Localization of the Lesion. Very excellent clinicians have more than once made a mistake in the situation of the disease, and have inferred from the physical signs that the lesion was in the apex of the lung when it was found in the base, and *vice versa*. You can readily see how such an error would handicap the operator. Dr. Packard has spoken to you of the various means we have at our disposal for an accurate localization, and I only wish to add a word about exploratory puncture. In this we have a fairly accurate guide to mark the position of the disease, but in using the exploratory needle we subject our patient to the grave risk of infecting a healthy pleura, and making a single gangrenous area multiple by withdrawing the infected point of the needle through healthy lung tissue. For these reasons I should use an exploratory needle only at the time of operation, when it will give a maximum of information with a minimum of risk to the patient.

Depth of the Lesion in the Lung. Should it become necessary to traverse healthy lung tissue to reach the diseased portion the risk from septic absorption will be greatly increased, for putrid discharges are readily absorbed by healthy lung surfaces. Therefore, the nearer the lesion is to the pleural surface the greater the probability that normal lung tissue will not be exposed.

The Existence of Pleural Adhesions. These cannot always be positively foretold before operation, but we believe them to be present in this case for the following reasons: The patient's history of previous sharp, localized pain in the chest, suggestive of pleural pain; the present localized tenderness on pressure; the constant, unchanging position of the gangrenous lesion; the slight retraction of the intercostal spaces, with inspiration, and the diminished movements of the end of a needle which has been entered into the lung All these signs point to adherence of the pleural surfaces. But how can we tell whether these adhesions will be sufficiently strong for our purpose, namely, to keep the lung firmly glued to the chest wall after we have penetrated to the diseased area? Our evidence of this is only circumstantial. We presume that the adhesions have existed for some weeks, and therefore, on account of their duration, that they must be firm and strong.

Operation. We make a broad, U-shaped incision down to the ribs in the posterior axillary line, and dissect up the flap, exposing the seventh and eighth ribs. The periosteum of the seventh rib is incised for a distance of three inches, and with a blunt elevator is carefully peeled from the entire circumference of the bone. The rib is divided with bone-cutting forceps in two places, about two and a half inches apart, and the section removed. The periosteum is now carefully incised, avoiding the position of the intercostal vessels, until the back of the parietal pleura is exposed. Inspection shows the bottom of the

wound of a uniform dull gray color with no to-and-fro motion of the lung, and the finger tells us that the lung within is immovable, resistant, and dense. This demonstrates the presence of adhesions. If they were not present the pleura would be a thin, semi-translucent membrane showing the movements of the pinkish lung within, and the finger would be able to appreciate its up-and-down movement. The sense of firmness and resistance imparted to the finger also tells us we shall expose infiltrated lung tissue. With a knife the incision is extended through the pleura into the lung to the depth of half an inch. We now see the lung tissue, of a gray-black color, filled with an inflammatory exudate, and equally resistant in all directions. The incision is again deepened with the knife for half an inch, directly inward toward the root of the lung, and the finger again carried in to palpate the surrounding tissue. In this way, by alternately cutting and feeling, we come to a place where there is a softer area, less resisting, and the finger-tip enters a cavity at a depth of two and a half inches from the pleural surface. This cavity is irregular in outline, the size of a small egg, surrounded by infiltrated, friable lung tissue, and as the finger is withdrawn it is followed by a gush of very foul-smelling greenish pus. This pus has the same odor and some of the characteristics of the man's expectoration, showing that the cavity has a more or less large communication with the bronchus. Having reached the seat of the disease, what more shall we do? Irrigate? No, for we might drown the patient by flooding the bronchial tubes, or start a pneumonia, or multiple abscesses by disseminating this highly infectious material. Shall we curette? No, for even a dull instrument might start a fatal hemorrhage or one that would be difficult to control with gauze packing. We will first by touch assure ourselves that no other cavities exist in the immediate neighborhood. With the finger inside of the cavity the lung feels equally resistant in all directions. If a softer area were discernible in one place I should investigate it for a probable second abscess. Next, with the finger covered with gauze we gently swab out the cavity, breaking down any small, projecting septa or partitions. This will remove as much of the sloughing tissue as we can take away with safety. A soft large rubber tube is fastened in, the skin flap perforated for its reception, and the incision closed with silkworm-gut sutures. There has been scarcely any hemorrhage from the cavity, so there is no need for gauze packing. Iodoform and sterile dry gauze complete the dressing. The patient's condition is fairly good, and he has stood the operation very well.

The after-treatment will consist in keeping up the patient's strength with stimulants and tonics, daily dressing of the wound, at which time the position of the tube will be slightly changed by turning it around and withdrawing or pushing it in a little further, and perhaps later by

irrigating the cavity, when we find out the tolerance of the lung. Two serious complications may develop—persistent hard cough and secondary hemorrhage. Cough will probably be due to the mechanical irritation of the tube, and may be controlled by changing the tube's position—*i. e.*, withdrawing it a little or possibly altogether for a time. Secondary hemorrhage is generally the result of ulceration from pressure of the tube, and we will try to prevent it by turning and changing the position of the tube, so that it will daily come in contact with different areas of the lung. Should hemorrhage occur the tube must be withdrawn and the cavity packed with gauze, and at the same time ice will be applied to the chest, and opium and suprarenal extract given. If the packing then brings on severe cough, opium will be freely given to allay it, for the danger of hemorrhage will prevent our removing the packing for some days.

The operation which you have just seen happened to be a very simple one, thanks to Dr. Packard's accurate localization of the diseased area, and to the existence of strong pleural adhesions. Unfortunately, many cases will be much more difficult, and it is well for us to consider now what we would do when the pleural surfaces are free or when the gangrenous area in the lung is not found.

If after resecting a rib and exposing the back of the parietal pleura we find that no adhesions are present, three procedures are open to us. First, more ribs may be resected, to the number of four or five, the parietal pleura carefully detached from the under surface of the chest wall, and a search made by touch and by sight for some point where adhesions exist. If they are found the lung is then opened over this point. While such a procedure has been successfully performed, I cannot recommend the method, for it seems to me that it blindly destroys a large area of the chest wall for a very small gain in knowledge. Second, a small opening may be immediately made into the pleura, a finger quickly introduced, and a search made for adhesions within the pleural cavity. If such a point is found the finger is withdrawn, the opening in the pleura closed, and the skin incision prolonged or a new one made, so as to attack the lung over the point of adherence. When the lung is partially adherent to the chest wall it cannot entirely collapse, and the dangers of a pneumothorax are greatly lessened. Third, if no point of adherence is found the finger will search for some indurated area on the lung surface, and over this area we will create adhesions artificially, by stitching the lung to the parietal pleura. A small curved needle with a long silk suture is passed through the parietal and visceral pleura a quarter of an inch deep into the lung, and the point of the needle brought out a quarter of an inch from the place of entrance. It is re-entered about half-way or an eighth of an inch back of the point of exit, and the same amount of lung tissue included in its grasp.

In this way an overlapping continuous suture is made to encircle a space the size of a quarter or a half-dollar. The wound is then filled with gauze and three or four days allowed to elapse for the formation of firm adhesions, when the operation is completed and the lung opened. If adhesions are encountered, but are found soft, friable, or treacherous, tampon the wound with gauze and complete the operation at a later period.

I cannot warn you too emphatically against the procedure of grasping the lung and opening a gangrenous cavity when adhesion of the pleural surfaces does not exist. In ten cases where this method was resorted to for purulent collections in the lung, five times the operation had to be abandoned, owing to alarming symptoms, two of the patients dying from acute purulent pleurisy and one as the result of the pneumothorax. Three times the cavity was opened, and death followed from acute purulent pleurisy, and in only two cases was the operation brought to a successful issue. Highly septic material when brought into contact with a healthy pleura is as fatal to the patient as it would be in the peritoneal cavity, and death will follow almost as rapidly from septic absorption.

Having successfully crossed the pleura, how shall we look for the diseased area in the lung if it is not immediately before us? Circumscribed gangrene in the lung is always surrounded by a zone of infiltrated inflammatory tissue—nature's barrier to the progress of the disease—so with the knife and finger we will explore any indurated area that may be present. If this fails to reveal the disease we will use the exploring or aspirating needle, and, by passing it in various directions in the lung, judge from the feeling imparted to the fingers the character of the tissue the point is traversing, and also from the discharges the needle may bring away. If this gives us negative results it is best to discontinue any further search, and complete the operation by leaving a drainage-tube in the incision in the lung. All hope of evacuating the septic material need not yet be abandoned, for several cases have been reported where the pus has found its way to the drainage-tube within a few days, and the patient has ultimately made a good recovery.

Prognosis and Statistics. The prognosis of gangrene of the lung is always grave, for many cases which at the time of operation seem favorable will later terminate fatally. In grouping all the cases together, irrespective of the etiological cause of gangrene, we find that under medical treatment about 80 per cent. die, and after surgical interference about 40 per cent. This great difference in mortality is not perhaps solely due to the brilliancy of surgery, for in all likelihood the cases that have been subjected to the knife have been more or less carefully chosen; but, on the other hand, it is undoubtedly true that many lives would have been saved had the surgeon been permitted to

operate at an earlier stage of the disease. Perhaps, then, these two conditions balance themselves, and we have in the numbers forty and eighty the true values of the two procedures. An examination of Tuffier's table of 71 cases where operation was undertaken shows that the etiology of the disease plays an important part in the prognosis. In 53 cases, where gangrene was the result of inflammatory affections of the lung, there were 15 deaths, or a mortality of 28 per cent. Where it was the result of bronchiectasis there were 4 cases, with 3 deaths, mortality 75 per cent.; of foreign bodies, 2 cases, with 1 death, mortality 50 per cent; of embolus, 7 cases, with 5 deaths, mortality 71.5 per cent.; gunshot wound, 1 case, recovery; perforation of the œsophagus, 2 cases, 2 deaths, mortality 100 per cent.; the etiology is not given in two cases. In examining the causes of death in these 28 cases we find 8 from progressive septicæmia or exhaustion; 5 in which both lungs were involved in the gangrenous process, 4 where the lesions in the lung were multiple, 4 from secondary hemorrhage, 3 operated upon *in extremis*, 3 from cerebral complications, and 1 where the cavity was not found at the time of operation.

NOTE. Brief history of the case after operation: Cough and expectoration considerably diminished; discharge from the drainage-tube free, very offensive, filled with streptococci and staphylococci, and containing many small particles of necrotic tissue. Within twenty-four hours marked emphysema developed, extending from the scalp to the scrotum, and down the right arm to the hand. This gradually subsided, but traces persisted to the end. Temperature varied from normal to 101° F. At the end of a week the patient was evidently rapidly losing ground. His appetite was gone, and free stimulation gave but little response. A gangrenous odor persisted in the discharges from the drainage-tube, but the sputum, which had again become copious, was almost odorless. Irrigation of the cavity was tried, but had to be abandoned owing to violent cough. Dyspnœa became more and more marked, the pulse weaker, the temperature hectic, sweating profuse, until death intervened on October 25th, the twentieth day after operation.[1]

[1] An autopsy was performed, and the specimens were shown to the class at a subsequent clinic. The results of the autopsy were briefly as follows: The left lung was twice the size of the right, very emphysematous and anthracotic, adherent for the most part, but where free the pleural cavity contained a small amount of bloody serum. On the right side the pleura was greatly thickened, especially at the base. The whole right lower lobe was the seat of a low-grade inflammation, with much excess of blood, with dense connective-tissue infiltration immediately around the gangrenous area in the right lower lobe. At the right apex there was a small bronchiectatic cavity. The bronchial glands were enlarged and deeply pigmented. The other organs showed no marked pathological lesions.

SCARLATINOUS EMPYEMA OF THE ANTERIOR SUPERIOR SQUAMOMASTOID CELLS.

SPONTANEOUS OPENING IN THE BONE; BURROWING OF PUS BETWEEN THE MASSETER AND BUCCINATOR; OPERATIVE INCISION IN THE SUPRA-AURICULAR REGION AND COUNTER-OPENING IN THE CHEEK; RECOVERY IN ALL RESPECTS.

By Charles H. Burnett, M.D.,
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On June 23, 1901, Alexina MacD., white, thirteen years of age, a farmer's child, living ten miles from Philadelphia, was admitted to the Presbyterian Hospital. The patient was at the end of the fourth week of an attack of scarlatina, and desquamation was well under way. The physician who accompanied her to the hospital stated that "almost at the onset of the disease her left ear had pained her and continued to do so for about two weeks, though a slight discharge had soon begun to flow from the external auditory canal." The ear had been freely syringed with peroxide of hydrogen and the meatus firmly stopped with the cotton. (This form of treatment I believe to have been the chief etiological factor in the production of the consecutive mastoiditis in this case, as it often is in other cases.) About the end of the second week the earache ceased, but the region above and in front of the auricle began to swell and grow tender to the touch, the tumefaction extending to the cheek.

At the time of her admission to the hospital the child was very pale and weak, being entirely unable to help herself. The left cheek was enormously swollen, the tumefaction extending from the zygoma and superior maxilla to the inferior maxilla. There was also great œdema above the zygomatic arch over the entire temple and above the auricle, the latter standing out from the side of the head at its upper and anterior insertion. The left eye was half closed by œdema, and the lids were ecchymotic. Just above and a little behind the upper wall of the bony auditory canal there was a prominent, pinkish fluctuating point. The mastoid region behind the auricle was entirely *devoid of any symptoms*. There was a slight discharge from the auditory canal, the membrana tympani was red and macerated, and there was a small perforation in its postero-inferior quadrant. The hearing was only slightly impaired. Her temperature was 103.8°; pulse, 124; respirations, 28. (She had just been brought in a carriage to the hospital, ten miles from her home.) Under the circumstances it was deemed best to place her in the isolation ward, with special nurse and resident physician. On account of her weakness and the lateness of the hour (5 P.M.) the patient was sponged and dressed in clean night-clothes, placed in bed and let alone until the next day. A milk diet was prescribed. Albumin was found in the urine. The next day the fluctuating point marking the position of a spontaneous opening in the squamomastoid region was frozen by means of ethyl chloride, and incised. About three fluidounces of creamy, odorless pus escaped, and was followed by some thinner, bloody pus. A probe inserted beneath the zygoma toward the cheek passed forward until its point could be

seen and felt projecting beneath the left eye, and when swept downward and backward it could be seen as it approached the angle of the lower jaw, following closely the lower insertion line of the masseter muscle. The probe point could also be felt on the inside of the cheek, by the finger placed in the mouth.

The buccal pus cavity having been emptied by gentle pressure, a female catheter was used as a drainage-tube, as its relative stiffness ensured its patulence and permitted its easy penetration to the depths of the pus cavity. Iodoform gauze was placed over the incision above the auricle, and the whole bandaged with sterilized gauze and let alone for twenty-four hours.

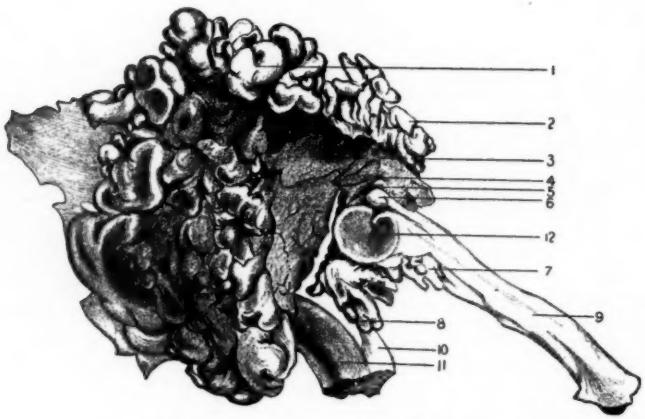
The next day the incision and the drainage catheter were found clogged with hardened pus and the buccal cavity again distended. The drainage-tube was then removed and the pus cavity well probed, with the result of evacuating about a fluidounce of bloody pus and débris. A fresh drainage-tube was inserted, the wound covered with iodoform gauze, and the whole region bandaged with sterilized gauze and let alone for another twenty-four hours. The patient was comfortable, slept well, and remained on milk diet. The percentage of albumin in the urine lessened.

Three days later (June 27) the notes state "the tube has been changed every day and the swelling in the cheek has greatly subsided. The patient's general condition is much improved and her temperature has gradually approached the normal, reaching 99° F. to-day. Albumin still present in the urine." I now observed that the opening above the auricle, supplemented by a drainage-tube, was not sufficient to drain the pus cavity in the cheek, as the latter lay largely below the supra-auricular opening. After emptying the buccal pus cavity by pressure with the hand, washing it out with bichloride solution (1 : 5000) and reinserting a drainage-tube, the temperature would go down, to rise again as the pus cavity in the cheek refilled. On July 1, a week after the supra-auricular incision, it was noted that "the patient's condition has been about the same, except that the temperature has remained somewhat higher than it was a few days after the above mentioned incision, reaching 103° F. on several occasions."

I resolved, therefore, to make the next day a larger mastoid incision for exploration of the mastoid surface, and also a counter-opening in the cheek, near the angle of the lower jaw. On July 2 the drainage-tube was removed from the wound above the auricle, and the patient prepared for operation at one o'clock P.M. On account of the intense heat of the day, 106° F. in the streets, and the exhausting demands on the entire hospital corps, necessitated by the large number of cases of sunstroke brought into the wards, the operation was postponed until the next day. The drainage-tube was not reinserted, pus reaccumulated in the buccal cavity, greatly distending it, the patient's temperature rose to 105° F., and albumin reappeared in her urine in large quantity. All these symptoms, however, promptly disappeared upon opening the wound with a probe and the removal of the retained pus by Dr. Joseph Ackerman, resident physician, in my absence. On July 3 the patient was etherized and a curved incision made from the temporal artery, and running from above and behind the auricle, to the tip of the mastoid process. Inspection revealed an opening in the surface of the squamomastoid region slightly above and behind the

bony external auditory canal, but the rest of the mastoid bone was entirely normal.

A curette was passed forward beneath the zygoma, and granulation tissue, slough, and thick bloody pus were scraped from beneath this bony ridge. Denuded bone was felt along this region for three inches. A grooved director was now passed from the anterior limit of the incision above the auricle directly downward into the pus cavity on the cheek, until its point could be seen beneath the swollen tissues, about two inches in front of the auricle, about half-way between the lobule of the latter and the angle of the lower maxilla. An incision was now made down upon the grooved director and the point of the latter thrust through the incision out upon the surface of the cheek. A rubber drainage-tube was then fastened by silk to the eye of a probe,



Cast of the middle ear and mastoid seen from without. (F. SIEBENMANN.)

1, upper external horizontal or squamomastoid cells; 2, anterior upper horizontal squamomastoid cells; 3, upper malleo-incudal space, attic; 4, external malleo-incudal fold; 5, lower malleo-incudo-squamous space, lower attic; 6, upper pouch of the membrana; 7, tubal cells; 8, tympanic cell, floor of the drum cavity over the jugular bulb; 9, Eustachian tube; 10, petrosal sinus, and 11, transverse sinus, lying together in the jugular fossa; 12, membrana tympani.

the point of which was made to follow the groove of the director until the probe point appeared at the counter-opening in the cheek, when the director was removed from above, and the probe armed with the drainage-tube was pulled through the buccal counter-opening. The posterior mastoid portion of the incision was sutured and healed by first intention. The anterior supra-auricular part of the incision was kept open for the upper end of the drainage-tube, the lower end of the latter being at the buccal counter-opening. The entire field of the operation was covered with iodoform gauze and bandaged.

The child's temperature went down gradually to normal and remained there. Albumin disappeared almost entirely from the urine, and she was removed from the isolation ward to a room in the Woman's Surgical Ward. The pus cavity in the cheek began at once to heal

from the bottom after I made the counter-opening in the cheek, and the latter was allowed to close in a week. The slight aural discharge ceased entirely. The opening above the ear was kept open with gauze drainage, which was gradually shortened as the buccal cavity became more shallow. As long as there was any discharge of pus from the pus-cavity the latter was syringed daily with bichloride solution (1 : 5000). By July 12th the patient was allowed to get out of bed and walk about the ward. There was still a faint trace of albumin in her urine. By July 20th all of the wound was healed. The membrana tympani still showed a small pin-head perforation in the postero-inferior quadrant. The hearing was normal. On August 1st the patient returned well in all respects to her home.

Pathology. The seat of the mastoid infection in the anterior upper, horizontal, squamomastoid cells was at about the point 2 (see illustration). Spontaneous perforation of the cortex of this region in the squama occurred at the end of the second week of aural mastoid inflammation, and was followed by cessation of the pain in and about the ear. The spontaneous opening in the bone being so far forward on the temporal region, and the recumbent position of the patient favoring a gravitation of pus beneath the more yielding tissues of the cheek rather than backward beneath less yielding tissues over the mastoid, thus there was formed a true gravitation abscess in the buccal tissues.

Etiology. In this case, as in many others, I think infection of the mastoid cells was induced by the use of hydrogen dioxide. The expansive power of this agent is so great that though it forces some pus from the ear it forces some inward, and the deeper cavities of the middle ear and its anterior and mastoid cells become infected. If this agent were not employed, and the natural siphonic drainage of the middle ear thus interfered with, secondary infection of the mastoid would not so readily take place.

Since I began this paper, the physician in whose practice occurred the case I have just reported asked me to see an infant of eight months in whom there was an abscess pointing in the mastoid region behind the auricle and some mucopurulent discharge from the ear. The story was the one I hear so often in these cases, viz.: Rhinopharyngitis about four weeks previous, earache a day or two later, discharge from the ear, then frequent syringing of the latter with hydrogen dioxide for two weeks, with lessening of the purely aural symptoms, *but the supervention of mastoid pain and swelling*, so that I usually see these cases in their *fourth* week. In the case of the infant just mentioned the physician volunteered the opinion that "syringing running ears with hydrogen dioxide did no good, but perhaps harm," to which I readily assented. In fact, I have never seen an acute empyema in previously normal mastoid cavities consecutive to acute otitis media that was not induced by the use of hydrogen dioxide. I am, therefore,

forced to conclude that such an empyema of the mastoid is not a necessary but an artificially secondary result of improper treatment of the primary acute otitis media.

The proper time to syringe or apply lavage in any way to an acutely inflamed previously normal ear is before the membrane ruptures and discharge sets in, in order to prepare an aseptic surface for the opening of the membrane, whether this be effected by the surgeon's knife or by nature.

After the membrana tympani is opened and the germ removing discharge is thus established, I find those cases do best in which the membrana is not touched by anything unless it be by a sterilized absorbent cotton mop by the aurist purely for purposes of examination. But there should be no syringing with anything, as this tends to infection and narrowing of the perforation, damming in of pus and consequent infection of deeper middle-ear cavities. No infectious mechanical obstruction should be thus placed in the way of the acute and beneficent tympanic discharge any more than in the way of a discharge from a pneumonia undergoing resolution, as the processes in both instances are analogous.

EMPYEMA OF THE FRONTAL SINUS: SOME OBSERVATIONS ON ITS TREATMENT.[1]

By George L. Richards, M.D.,
of Fall River, Mass.,
Otologist and Laryngologist to the Fall River Union Hospital; Fellow of the American Otological Society; Fellow of the American Laryngological, Rhinological, and Otological Society, etc.

The observations herewith presented are based more on my own experience than on an exhaustive survey of the literature of the subject and the reports of cases, and form, therefore, probably only a very limited view of a large subject, since the arc of the circle which any one man's experience subtends is necessarily very small; nevertheless, the sum total of human knowledge is made up of individual contributions.

A brief review of the anatomy of the frontal sinus seems necessary in order to deal properly with the subject of treatment. The frontal sinus varies in its position, in size, and in the thickness of its walls. It is not developed in early childhood, but appears about the age of puberty, probably from an extension of the ethmoidal cells into the frontal bone, and attains its full development around the twenty-first year. The

[1] Presented before the annual meeting of the American Laryngological, Rhinological, and Otological Society at New York City, 1901.

manner of its development may account for the great variation in its size, and for the relation which it bears to the anterior ethmoidal cells.

Normally, the most dependent portion of each sinus opens downward into the nose, through a duct called the fronto-nasal opening. This duct varies in diameter from one-twelfth to three-sixteenths of an inch, and in length from one-half to three-quarters of an inch. Its outlet is in the infundibulum, a term applied to the upper and anterior portion of the hiatus semilunaris, where it is bounded externally and behind by the bulla ethmoidalis, in front by the processus uncinatus of the ethmoid, and internally and above by the anterior third of the middle turbinate bone.

FIG. 1.

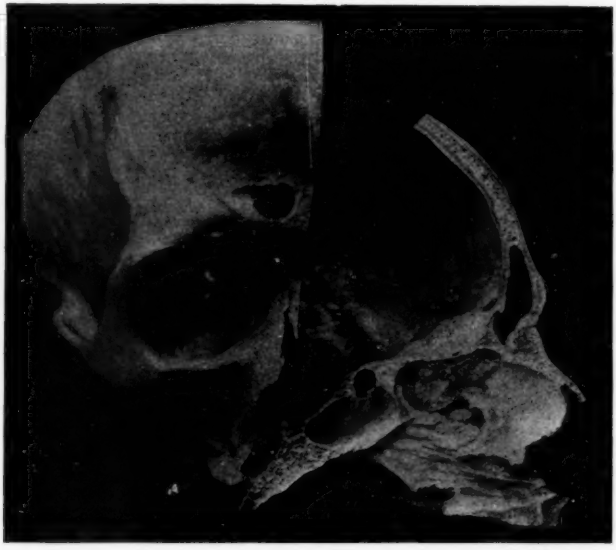
Right and left halves of the same skull. In the right there is a good-sized frontal sinus, the walls of which are thicker below the supra-orbital ridge than above, but an opening below the ridge would have given easy access to the fronto-nasal canal, and at the same time have been at the most dependent part of the sinus. In the left half the inferior turbinate and the anterior end of the middle turbinate have been removed. The natural opening into the maxillary antrum is indicated by the vertical dotted line, while above the processus uncinatus is plainly visible. The horizontal dotted line points to the infundibulum, which is prolonged into the frontal sinus as the fronto-nasal canal. In this case a probe or canula could probably have been passed into the frontal sinus. (Author's collection.)

The natural openings of the antrum of Highmore and those of the anterior ethmoidal cells are in the hiatus semilunaris, but behind the infundibular opening of the fronto-nasal duct. Between the frontal sinus and the infundibulum the fronto-nasal duct is separated by thin walls from the anterior ethmoidal cells, while in front of it are usually several small cell spaces, called by Hartmann the frontal cells of the ethmoid; of these he describes three—an anterior, an outer, and a posterior. These cells have very thin walls, sometimes almost as thin as paper. The direction and position of the infundibulum and fronto-nasal duct being dependent upon the size and development of all these

boundary structures, it is easy to understand how difficult it may be in many, or even in most instances, to satisfactorily reach the sinus, for purposes of exploration or treatment, through the natural opening.

The anterior wall of the frontal sinus is relatively thick; its posterior wall less so, but still quite thick; while its thinnest wall is over the orbit, a portion of the roof of which it forms, and at which point the wall may be very thin. Its extension outward and upward is very variable, being on an average from three-fourths to one and one-fourth

FIG. 2.



Two halves of the same skull. In the right half there is no frontal sinus above the supra-orbital ridge, diploëic bone being found in its place. Just underneath the ridge, at the inner angle, is seen an opening; this leads to a small sinus which communicates with the nose through the usual fronto-nasal canal, and is large enough for an empyema. The sinus is present in the left half. It is about the average in vertical extent, but outwardly extends but a short distance. In this specimen opening over the roof of the orbit would have come upon the dura. (Author's collection.)

inches above the fronto-nasal opening, and about the same distance outward. It extends backward over the roof of the orbit about half an inch. These are average measurements, but by no means constant. The two sinuses do not usually connect, but may do so; this very rarely occurs, except as a result of disease. They are also variable in their relation to one another, one sometimes being much larger than the other, or one sinus may entirely fail. The division line may be so far to one side as

to allow of the wrong sinus being opened at an operation, or it may run diagonally, as in one of my specimens, and there may be septa dividing the sinus into compartments.

What danger has the collection of pus in these sinuses? What are the chances of cure and the best methods of bringing this about? As to the danger, it seems to me that so far as life is concerned this is relatively small. This statement I regard as correct, in spite of the fact of deaths being reported from chronic empyema of the frontal sinus; since anatomical anomalies, secondary infection after operation, or unusual virulence of the pus would account for these, as reports seem to show. We have all discovered cases of chronic empyema of the frontal sinus, with a constant discharge of foul pus, in which the general health was really very good, and the danger to life by the presence of the pus almost *nil.* I recall one such case, in which the pus discharge had probably existed for years without any great disturbance of health. Relief was sought on account of the nasal obstruction and the foul odor. Polypi were cleared out, the middle turbinate removed, and, this failing to cure, the sinus was later opened externally. It was found to be filled with pus and a low grade of granulation tissue, which latter bled most freely on being curetted. After the thorough removal of all diseased membrane recovery was prompt and uneventful, and there has been no recurrence of the trouble.

If one considers the anatomical relationship, and the fact that nature usually seeks an outlet through the path of least resistance, it will be found that there can be no outlet which nature is likely to force except downward, or downward and forward, or outward through the wall of the orbit; that is, nature will be most apt to force her way out in the region of the ethmoidal and frontal cells, or through the roof of the orbit, in which latter place it is probable that spontaneous evacuation sometimes takes place.

Aside from the symptoms of pain and headache in the neighborhood of the sinus, and the complaint of nasal obstruction, the diagnosis is made by inspection of the discharge, which appears underneath the middle turbinate or between it and the septum, and by exclusion of the other possible sources from which this pus might come. Pressure upward on the wall of the orbit will usually elicit pain, though this is not constant. Disease of the antrum and of the sinus may coexist, and in many cases it may be necessary to make an exploratory incision into the antrum to exclude that as a possible source of the pus. I have several times opened into the antrum in the canine fossa, under cocaine, to determine the presence or absence of pus. Puncture underneath the anterior end of the inferior turbinate is equally efficient for diagnosis. When antrum and sinus are both diseased it is likely that one has infected the other. The antrum is usually the first to be operated

upon under these conditions, as the discharge from the frontal sinus may take care of itself after the antrum is healed. If the exploratory puncture of the antrum has been negative, we then have the anterior ethmoidal cells and the frontal sinus as the possible sources of the pus. The diagnosis here may possibly be very difficult. Transillumination, while by no means decisive, has seemed to me of some value as a diagnostic measure. It certainly is, so far as antrum disease is concerned; and in two of my frontal sinus cases the information furnished by transillumination was positive and accurate.

In the text-books one is taught how to carry a probe through the hiatus semilunaris and the infundibulum directly into the frontal sinus. In practice, with a swollen mucous membrane and an enlarged middle turbinate, the whole of which may have been bathed with pus for a long time, and where polypi may also be present, this may be extremely difficult, or even impossible. The observer may think that the probe is in the frontal sinus when it has passed into some one of the frontal or anterior ethmoidal cells, or even when it is in the superior meatus. The first thing to do, then, in any case in which pus is evident, is to clear away any obstruction, such as polypi, that may be present. As a rule, it will be necessary to remove the entire anterior portion of the middle turbinate. This also applies to those cases in which the suppuration is acute—such cases as are not infrequently seen following the grip, and in which the drainage is obstructed by the swelling of the mucous membrane and its underlying connective tissue.

These acute cases tend to get well if the drainage is free enough; and on their first discovery the middle turbinate should be removed and the drainage made as free as possible. After this is done it is frequently comparatively easy to find the track up to the frontal sinus, and with the aid of a silver or hard-rubber tube, properly bent, to wash out the sinus, and in a relatively short time to bring about recovery. The proper curve of the tube is obtained by first passing a long silver probe and then copying its curve. In cases of this class the question of an external operation ought seldom to occur, and the diagnosis is usually not a difficult one to make or to differentiate from ethmoiditis or antrum disease, since the attack is acute, is accompanied by pain over the eyes and forehead, and the whole clinical picture is one that admits of comparatively little doubt as to the trouble. I have recently had an acute case of frontal sinus empyema, in which after removal of the middle turbinate it was easy to pass a curved canula into the sinus. Daily syringing produced a cure in six weeks, and after some months there has been no recurrence.

In that large number of cases in which the purulent discharge has lasted a long time, and in which the formation of polypi has been brought about from the constant draining of the pus over the struc-

tures, and all the adjacent ethmoidal cells are very likely more or less involved, the question of treatment becomes less easy to decide. These cases are of all degrees of severity. An example of one of the severer ones may make my meaning clearer.

Some three years ago a patient was referred to me by an oculist on account of some trouble in the nose following typhoid fever. She had

FIG. 3.

Specimen somewhat broken, but showing a good-sized frontal sinus, with very thick anterior wall. The ethmoidal spaces are very large, have extremely thin walls, and communicate with the cavity of the sphenoid. All of the turbinates and the infra-orbital wall have been removed. In case of chronic empyema, the entire frontal, ethmoidal, and sphenoidal areas might have been affected. In that case no single operation would have been thorough enough to have eradicated all of the disease. It is specimens like this which probably account for the long and unsatisfactory course which empyemas in this region sometimes take. (Author's specimen.)

complained for several years of severe headaches, for which she had been treated by many physicians. She finally drifted into the hands of an oculist, who, finding that glasses were of no avail, examined the nose. To his surprise, he found that breathing through each nostril was difficult, and that there was a constant discharge of pus from each

side. Thinking that the cause of the headaches might in be the nose, he referred her to me for treatment. Treatment was commenced by first removing at several sittings large numbers of mucous polypi from each nostril. I then made exploratory punctures into each antrum without finding any pus. The pus discharge diminished very much from the left nostril, but was no better on the right. I next removed each middle turbinate. Still the headaches were about the same, and the discharge of pus was constant; nor did syringing into the sinus, which was done fairly easily on the right side, less so on the left, seem to accomplish much. I then did the infra-orbital operation on the right side, in the angle formed by the eyebrow and the root of the nose, and opened freely down into the nose. Fluid pus, without granulations, was present. Thinking that I had now accomplished drainage by external and internal means, I allowed the external wound to close in a short time, and did not carry any drainage-tube down into the nose.

There was improvement for a while, but the pus discharge continued, and after a few months I again operated, this time on both sides, in the same locality, and found pus in each sinus. The opening into the nose was enlarged with large curettes, and iodoform gauze wicking passed through, followed in a few days by good-sized fenestrated rubber drainage-tubes passed clear into the nose; these latter were retained for four weeks. The external openings closed; the openings into the nose, in spite of their size, became so small that a silver probe could not be passed through without pain; still the pus discharge continued.

After a few weeks more she was again operated upon. This time the curette was used with greater vigor, so as to break up all of the cells in the region of the outlet; and larger drainage-tubes were put in each sinus. The amount of pus at this time was pretty small in the right side, but she had been complaining greatly of pain in it. Healing took place as before. The tubes were retained several weeks, but still the pus continued. She was allowed to go home, but as the pain was complained of as much as before, and the pus discharge was considerable, she was operated on again two months later.

This time the incisions were made higher up on the forehead, above the supra-orbital ridge, with the hope that the curette could be passed down into the nose more directly and the operation be a thorough success. It was found that there was still pus in the left sinus, but that the right one had completely closed and had become filled with new osseous growth. This fact would seem to harmonize with the statement of Hajek, that the pain is sometimes worse on the sound side, since, in spite of the healing, the pain did not disappear. At no time did the two sinuses communicate. The wound again healed, and I was under the impression that I had accomplished a cure, as relief was obtained for a time; but something over a year later she came to me with the

statement that there was still some slight pus discharge from each nostril and an occasional swelling at the inner angle of the right eye, with considerable throbbing pain in the region of the temples, especially on the right.

At her own request she was again operated on. Both frontal sinuses were found to be closed with new bone, and were therefore not opened throughout their whole extent. The natural opening into the nose was reopened and made as large as possible, and all anterior ethmoidal cells that could be reached were broken down and destroyed. The right antrum was opened, but contained no pus. An attempt was made to open the right sphenoid sinus, but it was not very successful. Large drainage-tubes were carried down into the nose, and the external openings closed. The throbbing pain ceased, and the general pain after operating was less than usual. The rubber tubes were removed in five days. On the right side a curved silver tube was carried from the external incision down into the nose and retained three weeks. She is improved in every way, though still under treatment, and the pus discharge from the nose has not entirely ceased. That an absolute cure has been obtained is doubtful, as improvement has followed all previous operative procedures. Considering the number of operations the cosmetic results are very good.

I am inclined to think that in this case I have had an empyema not only of the frontal sinus, but of all the adjacent ethmoidal cells, possibly extending as far as the sphenoid, and that the earlier operations failed to open sufficiently for efficient drainage some one or more of these cells; and if I were to draw any lesson from my own failures in this particular instance, it would be to suggest that when an external opening is made the anterior ethmoidal cells should be destroyed with the curette as far back as it can be made to reach when used from above; and if the cutting portion is kept backward and outward, or outward and forward, there is but little risk of injuring any important structures. If turned toward the centre line it will be possible to injure the lamina cribrosa, which is from 14 to 20 millimetres only from the root of the nose and about on the same level, though sometimes deeper.

The foregoing is an extreme case; but can any of the chronic cases be cured by intranasal operative methods? Hartmann thinks it will but seldom occur that they can. In the chronic cases, how long shall the operator be content with having secured fairly good drainage; for it is only exceptionally that the element of severe pain comes in, as in the case just cited? According to Hartmann, the external opening should be made when, after a fair trial of intranasal drainage, the discharge continues and there is still pain. Most of the chronic cases get a certain amount of relief after the removal of the middle turbinate, and are

then somewhat loath to consider the question of an external operation, fearing the deformity and having a certain dread of the length of time required for healing; though the latter, I am sure, would be very much shortened if a sufficiently large opening were made down into the nose at the time of operation; and the deformity, when the operation is done at the inner angle of the eye, under the infra-orbital ridge, is nothing. The washing out of the sinus, even after the removal of the turbinate, is still difficult, since the outlet is small; and if polypi or granulations are present in the sinus no cure will ever be effected until an external opening is made. Various solutions are used for syringing into the sinus. Personally, I have had better results from corrosive sublimate, 1 : 10,000 to 1 : 15,000, than from peroxide or any of the other solutions usually advocated. To be sure, the corrosive sublimate irritates sound tissues and is sometimes painful, but it does more good than any substitute. It should be followed by an alkaline douche through the nasal cavities and pharynx, to offset its irritant effect upon the sound tissues. Protargol, in 2 to 5 per cent. solution, has proved of service in the hands of several observers.

I should say, then, that after spending a reasonable length of time in the attempt to gain proper intranasal drainage by syringing and douching, the question of an external operation should be presented to the patient and he be allowed to make the choice. He will be very likely to ask if we know that there is pus in the frontal sinus, and if a cure will result; and to both of these questions we may be in doubt as to the answer. Hartmann reports a case in which, after opening the frontal sinus, no pus was found, but on further exploration pus was found in the frontal cells. I once opened the frontal sinus in a case of pus discharge which I had at first supposed to be purulent ethmoiditis, having found no pus on exploratory puncture of the antrum. The pus discharge not disappearing after removal of the middle turbinate, I concluded that the sinus must be infected. It was opened and no pus found. Healing took place in four or five days, and no unpleasant results ever came from the operation. The pus, without doubt, came from some unopened ethmoidal cells or from the frontal cells in the region of the fronto-nasal canal.

Will a cure result? This is the other question certain to be asked. Sooner or later, yes; but how long it will take will depend on the extent of bone involved; and this is a question difficult to determine before the sinus has been explored. Diseased bone is notoriously slow to heal so long as any portion of the disease is left, since so long as there is any left it is liable to break down and form pus. Then, again, I have found the tendency of the canal in the nose to close to be a constant source of difficulty. To illustrate:

A case of empyema of the antrum was opened, cleansed, curetted,

cured. Pus appeared in the nose. The middle turbinate was removed and the discharge found to come from the frontal sinus. The sinus was opened thoroughly, and, having in mind previous experiences, the opening into the nostril was made, as I supposed, sufficiently large. A drainage-tube was retained two weeks, and the opening then allowed to close. Five weeks later there was a swelling at the region of the external wound, and the sinus, or at least a portion of it, was found filled with pus. Under cocaine the walls of the sinus were thoroughly curetted and an endeavor made for weeks to bring about healing, but without avail. An ether operation was again done, more bone cut away, the sinus curetted in its whole extent, and the opening down into the nose very much enlarged, a drainage-tube reinserted, and the opening allowed to close. The case was discharged, apparently well, but returned some weeks later with pus as before. The sinus was curetted, drained, irrigated with corrosive sublimate, and at last healed. This last time I was able, with the aid of a silver tube, to prevent the opening into the nose from closing until the bone was apparently healthy. Some months have now elapsed without any return of the trouble, and there is no deformity.

In another somewhat similar case, which also combined antrum and sinus trouble, a gold tube was made and kept in the external wound for a long time, until the last vestige of pus had disappeared.

So far, then, as the external operation is concerned, it must be allowed that the question is by no means so simple as it at first might be supposed, since the so-called radical operation is not always certain to result in a cure.

At the meeting of the Laryngological Society of London in February, 1901, this subject was discussed, and the weight of the argument seemed to be in favor of the more conservative methods of dealing with these cases intranasally. Dr. St. Clair Thompson thought that we should be slow to claim a complete cure in these cases, and recorded a case in which, although the operation had been done two years before, the patient still had to syringe her nose three times a day. The pus, he thought, had come from the ethmoidal cells rather than from the frontal sinus, as the fronto-nasal duct was quite obliterated before he allowed the sinus wound to heal. This, however, only confirms my statement that in the chronic cases we probably usually have to deal with an inflammation of the ethmoidal cells as well as of the frontal sinus.

At this same meeting Dr. Herbert Tilley said that in cases in which only a drop or so of pus showed itself at the end of each fronto-nasal canal he did not consider himself justified in advising a radical operation, and that the nose should be merely cleansed once or twice daily and nothing else done.

Sir Felix Semon replied in answer to the question, "When ought one to perform a radical operation in these cases?" that it was a great achievement to be able to diagnose these cases better and to treat them more successfully than in the past. Over a practice of twenty-five years devoted to special work he had seen plenty of these cases, and, so far as he knew, very few of them had come to grief prior to the discovery of the modern forms of treatment. There had been a few cases with threatening symptoms, but they were and are very few. He had seen cases in which suppuration still continued after the performance of the radical operation, further operations were necessary, and the patient finally was not much better off than before. In his opinion, it is a matter deserving very great consideration as to whether or not the discovery of a little pus coming from the frontal sinus demands a radical operation in every case; and the surgeon is bound to tell the patient that the big operation occasionally leaves some deformity.

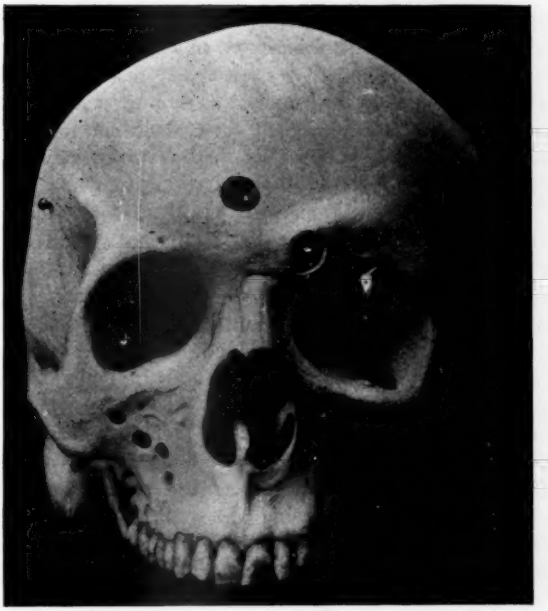
Dr. Lambert Lack thought that the indications for external operation are rather indefinite. If the symptoms are of only slight purulent discharge, he thought the cases best left alone. The middle turbinate should first be removed, the anterior ethmoidal cells opened, and the approach to the infundibulum thoroughly cleansed. If this failed he operated externally, endeavoring always to obliterate the sinus, as the only certain method of obtaining a cure. He thought that many cases reported as cures by intranasal operation are really only cases of ethmoidal cell disease.

As a whole, this discussion seems to me to be leaning rather to the extreme of conservatism. It is certainly much more conservative than the other extreme, viz., the operation which Hartmann describes, of removing the whole of the anterior wall of the frontal sinus (Die Verödung der Stirnhöhle durch Abtragung der ganzen vorderen Wand). This would doubtless produce a cure, but it is a question whether our American patients would care for the operation. Hartmann himself is opposed to such an operation on account of the great deformity which results, and says that it does not seem to be necessary, as healing can be brought about through the establishment of a free communication with the interior of the nose.

In the final analysis the question of operation must depend in each individual case upon symptoms, such as recurring attacks of pain and cerebral irritation, which suggest dangers to the organism from septic absorption; and upon the judgment of the operator and the confidence reposed in him by the patient. In many persons the question of confinement, or the length of time they will be kept from work, will have a large influence, and they will prefer to endure the discharge of pus which is not producing alarming symptoms rather than be kept

from their daily vocation long enough to produce a cure. I have such a patient at the present time. The daily washing keeps her comfortable; there is no retention of discharge; and she thinks she cannot afford to lose the time required for the radical operation. In another case removal of the polypi and middle turbinate has so much improved all the conditions that the radical operation is declined on the ground

FIG. 4.



Specimen with good-sized accessory cavities, in which operation in any of the places recommended by various authors would have reached the sinus and allowed abundant room. On the right side is indicated the site for the opening above the orbital ridge and also the openings for operation in the orbital roof. In this specimen there are several septa in the sinus floor and large frontal cells; and had there been an empyema it might have been necessary to do one of the radical operations in order to entirely eradicate the disease, though the opening below the ridge could easily have been enlarged sufficiently to give access to the entire sinus area. Below on the left side is indicated the site for operation on the maxillary antrum, while the small openings on the right side show somewhat of the boundaries of the antrum. (Author's collection.)

of lack of urgent symptoms. The drainage is good, the pain on pressure over the eyebrow has disappeared, the odor though still present is much less, and there is but little discharge. As this patient is over seventy years old, and his cardiac conditions are poor, I am limited to intranasal methods of treatment.

If the external operation is decided upon, where shall the opening be made, and by what means? The question of scar is one not to be lightly passed by, and I am decidedly opposed to such an operation as Hartmann describes, in which, after first making an incision and cutting away the bone in the line of the eyebrow, but underneath the ridge, he then opens at right angles down to the eye, lays aside the soft parts, and cuts away the frontal cells, taking care that he does not remove any of the important muscles or soft parts of the eye. This is undoubtedly effective in laying bare the sinus, but leaves an unnecessarily large opening. He does this only when the simpler operation has not opened the cells sufficiently or brought about a free enough communication with the nose.

From my own experience I prefer always to make the opening between the supra-orbital notch and the root of the nose and underneath the ridge. Whereas the wall of the sinus is comparatively thick at this point, the sinus itself when opened is as roomy as at any place, and the bone opening is easily enlarged upward as far as the upper border of the ridge, and outward, so as to give a sufficient amount of room to enter a fairly good-sized curette and explore every part of the region. While the fronto-nasal canal is easily accessible at this point, it is at the same time also the most dependent portion of the sinus. So long as the upper border of the supra-orbital ridge is left the resulting deformity is practically nothing, as the new growth of the eyebrow takes care of the scar.

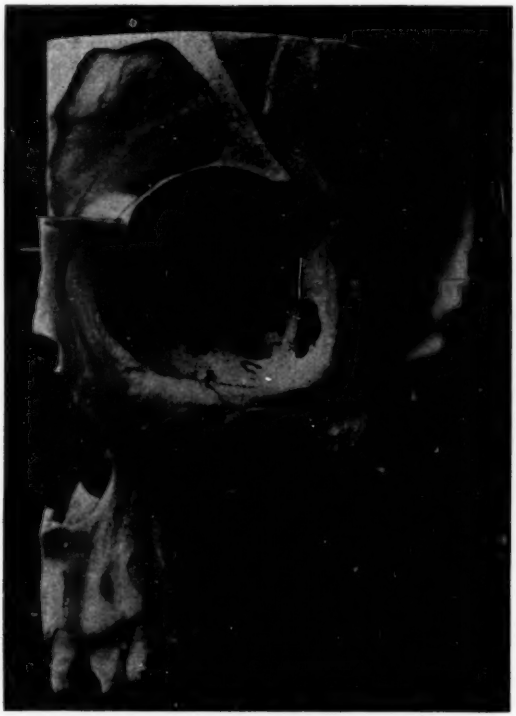
Before beginning the operation the post-nasal space can be plugged, to prevent the swallowing of blood. A string should be attached to the plug, one end being brought out through the free nostril and the other out of the mouth. After shaving the eyebrow and properly preparing the surface a circular incision is made from just inside the supra-orbital notch and along the lower third of the eyebrow as far as the root of the nose or a little below. The periosteum is laid back, the bone bared, and an opening made down to the sinus at the centre-point of the incision. The sinus being opened and explored with the probe, the external opening is still further enlarged as in the individual case may seem necessary. When this is done sufficiently a probe can be passed downward into the nose through the natural opening and its direction noted. This opening is then enlarged with the curette, so as to give all the room that is needed, more of the bony wall being cut away if required and in whatever direction needed; and, bearing in mind my own experience, I should urge upon the operator to make a larger opening into the nose than he thinks he needs—in fact, the largest opening possible, especially backward and outward, so as to avoid any danger of injuring the lamina cribrosa. Use small curettes at first, and larger ones if needed; those with curved shanks are pre-

ferable. The whole area of the sinus which can be reached is to be curetted and its ramifications followed up. The extent and vigor of the curetting will depend upon the condition of the mucosa and the presence or absence of granulations. As far as possible, all of the ethmoidal cells in the immediate vicinity should be opened. When using the curette in the fronto-nasal canal or in the ethmoidal region the little or index finger should be kept in the nostril as a guide, the middle turbinate having been in all cases previously removed.

I have tried gauze wicking of good size as a means of keeping the fronto-nasal canal open, but do not like it, as it is very painful to remove. Drainage is best attained by means of rubber tubes slightly fenestrated, one end of which presents at the external wound and the other out of the nostril. These may be changed every other day, the new one being readily attached to the old one by carrying a needle with a long thread twice through each one and leaving the threads, cutting out the needle at the eye. The old tube is then drawn down, the new one follows it, and the threads can be cut off. The advantage of putting the thread through twice and then leaving it long is, that if there is any interference on the way and the rubber pulls the threads might pull out and the following tube be lost; but if the threads are sufficiently long the following tube will not be lost, and the first one can be drawn back in case the second tube will not follow, and a smaller tube can then be used. These tubes should be retained as long as may be necessary, certainly two or three weeks. After that time if a tube is required it is better to use one of silver, properly curved. At the time of operation a stitch is put at each side of the wound, leaving an opening sufficiently large for the drainage-tube. In cases which have lasted but a short time, if the opening into the nose is very large, it may do to close the external wound; personally, I prefer to keep it open for a while, when if the case progresses well the tubes can be removed and the opening allowed to close. As the incision is a curved one, when the tube is finally withdrawn the tendency is for the opening to close perfectly, leaving only a slightly depressed scar, completely covered by the eyebrow and not noticeable in any of my cases except on close inspection. When the opening is made on the forehead above the ridge there is more likelihood of an unsightly scar if it cannot be closed at once and perfect apposition obtained; there is also more likelihood of a depression than when the opening is made at the angle of the eye. The only possible advantage of opening above is that the opening down into the nose is rendered straighter. I think, however, that this advantage is more theoretical than real. If the operator were certain that he had removed all of the diseased mucous membrane, and that the outlet into the nose was sufficiently large, the external wound might be closed at once; of this, however, one cannot be sure.

In case the cavity is filled with granulations, Hartmann would take off the frontal wall. As already cited, one of my cases was as full of granulations as it could be, and yet it healed in less time than any of the others; so that it does not seem to me to be necessary to take off the frontal wall.

FIG. 5.



Specimen showing large frontal sinus extending backward and outward over the entire roor of the orbit. In case of empyema, operation underneath the supra-orbital ridge and between the supra-orbital notch and the root of the nose would give ready access to the whole interior of the sinus and to the fronto-nasal canal as well. (Author's collection.)

Considerable swelling of the loose tissue about the eye always follows any external operation, but lasts only a few days.

The after-treatment will depend upon how thoroughly the disease can be eradicated at the first operation. In many cases recovery will be prompt and satisfactory; in others final healing will be tedious and long delayed, and there may be some pus discharge for some time. The pus discharge may come from some of the ethmoidal cells, which

in long-standing cases are almost always involved. Re-operation may be necessary, even when the first operation was apparently absolutely thorough. The principle which must be our guide is, remove all diseased bone and mucous membrane that it is possible to remove, provide free drainage, and have as little remaining deformity as possible. The time required for a cure varies, according to the degree of severity of the disease, from a few weeks to several months.

Beside the operations described there are a number of other procedures for the cure of empyema of the frontal sinus which bear the names of their originators, and which I shall briefly describe, since they appear frequently in literature, and there is sometimes some confusion of terms.

The Operation of Nebinger-Praun. The essential point of this is the wide opening of the anterior frontal sinus wall. An incision is made from the naso-frontal suture along the orbital border of the supra-orbital notch. The anterior bony wall is laid bare, whatever is necessary, first of the nasal, and then of the frontal bone, being chiselled away. A vertical incision, 4 to 6 cm. long, is next made, following the border of the frontal vein. Bone is now chiselled away corresponding to the breadth of the sinus, the horizontal portion being laid bare. After the horizontal portion is laid bare, the purulent contents removed, and the wall curetted, the opening into the nose is enlarged. Nebinger recommends draining the sinus at the place of junction of the horizontal and vertical cuts.

The Operation of Jansen. The chief feature of this operation is the removal of the inferior wall of the frontal sinus, and, in very large sinuses, partial resection of the anterior wall. A curved incision is made underneath and parallel to the eyebrow from the lateral border of the orbit to the side wall of the root of the nose. After loosening the periosteum the superior wall of the orbit is laid bare. The inferior wall of the sinus is next removed. In the case of a very large sinus the inferior border of the anterior wall is also removed. The diseased mucous membrane and granulation tissue are removed with sharp curettes.

While this method gives free access to the floor of the sinus, the opening into the nose is not so readily attained as by some of the other methods. Having seen some cases some time after the Jansen operation, I am not especially pleased with the ultimate cosmetic results; in one case, particularly, the eye on the operated side seemed to sag.

Method of Ogston-Luc. To open the sinus and ethmoidal cells an incision is made along the inner third of the orbital wall, extending about 1 cm. until the root of the nose is reached, the periosteum laid back on one side toward the forehead and on the other from the orbit, and the sinus opened a little to the outward from the median line and mostly above the orbital ridge. After opening the sinus an opening

is next made into the ethmoidal cells, and after establishing a wide communication between the sinus and the nose a drainage-tube is carried down into the nose, and the external wound at once closed.

This operation has many advocates, and is frequently performed. When the external wound is at once closed it is probable that the resulting scar is very slight. In those cases in which it becomes necessary to keep the external wound open for a time—and these are quite common—it does not seem to me likely to produce as good cosmetic results as the infra-orbital operation I have described.

Method of Czerny. Czerny makes an osteoplastic flap, enlarges the opening into the nose, tampons with iodoform gauze for a sufficient length of time, and as soon as healing is brought about lays the skin flap, with its attached lamella of bone, on the side of the original wound. This is said to produce good results, without deformity.

Method of Kuhnt. This consists in the removal of the entire anterior frontal sinus wall and the entire diseased mucous membrane, including the upper portion of the fronto-nasal canal. A horizontal incision is made along the inner two-thirds of the supra-orbital ridge; then a vertical upward incision is made at the inner angle of the first incision. After pushing back the soft parts and the periosteum the entire anterior wall of the frontal sinus is removed with chisel and bone-cutting forceps. The bone edges are left smooth and all septa in the sinus are removed. The entire mucous membrane is next removed from the sinus and from the upper portion of the fronto-nasal canal. A drainage-tube is then inserted and the external wound closed with sutures. The after-treatment consists in the daily syringing of the sinus with sublimate solution. The stitches are removed on the sixth or seventh day.

Röpke has modified this operation so as to make a wide passage from the floor of the sinus to the ethmoidal cells, clearing out the latter as far as necessary and then packing the cavity with iodoform gauze. When both sinuses are affected the vertical incision is made in the middle line, and the anterior walls of both sinuses, together with the division line and the prominent portion of the nasal process of the superior maxilla, are removed.

The cosmetic results are said to be good, there being marked depression in only one of Röpke's cases. Double vision was present in three cases, but passed away after a while. Unless the mucous membrane is entirely diseased it would seem almost superfluous to remove every portion of it, since it must all be re-formed again for the proper nourishment of the interior of the sinus unless the sinus is to be obliterated. In this latter case I fail to see how there can help being some deformity after such an operation as this.

Operation of Killian. This consists in chiselling and curetting the frontal sinus, with temporary resection of the nasal bones.

Operation of Spiess. Spiess opens the frontal sinus intranasally with the drill and the end of a flexible shaft, under the X-ray.

This operation would seem to be a rather difficult one to do, and not entirely devoid of danger, since where there are so many sinuses and cells the X-ray picture might easily mislead. I have seen some of the X-ray pictures of the operation in Dr. Spiess' clinic. Both Dr. Spiess and Prof. Moritz Schmidt regard this method of operating as valuable and certain, since it gives a large opening into the sinus without external opening. So far as I know, this method has not as yet been followed by other operators, at least not to any extent.

It would be much simpler if these various operations were described and known according to their anatomical characteristics rather than by the names of their real or fancied originators. Too many things in medicine and surgery are described in this manner. It seems to me that it is sufficient, and far better, to describe a procedure as such, rather than as A.'s, B.'s, or C.'s. The reader is then enabled to know what is being described without first looking up a biographical dictionary of medicine.

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THE DIAGNOSIS OF LATENT FRONTAL SINUITIS.[1]

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The inflammatory diseases of the frontal sinus may be either manifest or latent. Under manifest inflammations are included all those cases where the inflammatory discharge, often on account of obstructions to its normal outflow, seeks an outlet through the walls of the sinus, and in so doing produces symptoms which point unmistakably to involvement of the sinus.[2] These symptoms and their relation to disease of the frontal sinus have long been understood. This is the classical empyema.

Aside from these comparatively rare cases of manifest frontal sinuitis,[3] there exists a far greater number of cases where the disease produces no outward or manifest symptoms and where the only abnormal conditions are the secondary changes produced by the pus where it is discharged into the nose, with, perhaps, a few uncertain subjective symptoms. This so-called latent sinuitis passes often not only unrecognized, but unsuspected. The detection and differential diagnosis of this condition is distinctly an achievement of modern rhinology, and is generally considered to be the most difficult to demonstrate of all the accessory sinus diseases.

Latent frontal sinuitis often lasts over a period of many years, with longer or shorter intervals when an acute exacerbation of the trouble produces symptoms which, while they do not point positively to disease of the sinus, at least should lead one to suspect this condition.

Among these symptoms frontal headache is the most constant. This is sometimes only a dull, heavy feeling or sensation of pressure, sometimes of a more severe, throbbing character. More characteristic is an intermittent type of frontal headache coming on in the morning and disappearing toward the middle of the day, only to return with systematic regularity the next morning at the same hour. The intermittent character and the location just above the orbit have often led to a mistaken diagnosis of supra-orbital neuralgia. This typical frontal headache is commonly seen in cases of acute inflammation which so frequently follow coryza, and especially influenza. Here the congestion

[1] Read before the Chicago Medical Society, December 18, 1901.

[2] The old view that the cause of pus breaking through the sinus walls is always obstruction or closure of the nasal orifice, is not tenable, since it has been repeatedly observed that the passage was freely open in cases where ectasia took place.

[3] The term *sinuitis* has been used in some recent publications in English. The term signifying inflammation of a sinus should be formed by adding to the noun stem *sinu-* the suffix *itis*, which gives the term *sinuitis*. This is the term used by the best foreign authorities, and it is desirable that we should adopt it.

about the orifice of the nasofrontal duct causes a temporary closure analogous to the closure of the Eustachian tube under similar conditions. The headache is often relieved by the application of cocaine about the orifice of the duct in the middle meatus. The intermittent character of this headache, coming on shortly after rising and disappearing when the patient has been up several hours, has been explained by the secretion accumulating while the patient is in the horizontal position, for then the opening is not at the lowest point of the sinus. When the upright position is assumed, this accumulated secretion sinks into the opening of the nasofrontal duct, which now forms the lowest point of the sinus, and by its pressure there causes pain until it has finally escaped into the nose.

Characteristic as frontal headache often is in cases of frontal sinus disease, it is not a positive diagnostic sign. Empyema of the antrum often causes a similar headache, and neurasthenic headache may readily be mistaken for that of frontal sinuitis. In cases of unilateral inflammation it has occasionally been observed that the pain is more severe over the normal sinus. I myself have never seen this in connection with frontal sinus disease, but in a case of unilateral empyema of the antrum I have seen a severe headache of long standing, which was limited to the opposite side, disappear completely upon irrigation of the diseased sinus.

Of greater diagnostic significance is the tenderness on pressure often felt over the affected sinus. This can sometimes be felt over the entire anterior wall; sometimes the orbital wall alone shows tenderness, this being the thinnest wall of the sinus. Percussion of the anterior wall will often show distinctly more tenderness over the diseased sinus. In several cases I have been able to verify the experience of Kuhnt, who was able to outline the extent of the sinus by noting the extent of the tenderness. Tenderness over the sinus often fails when the intranasal examination shows the presence of pus in the sinus. On the other hand, tenderness of a marked degree is occasionally found over a normal sinus.

Transillumination does not give such reliable results as with the maxillary antrum. I have seen several cases where a deeper shadow was found over one frontal sinus, and where afterward an empyema limited to that sinus was demonstrated. More often, however, I have found transillumination give negative results, when a further examination disclosed the presence of pus.

In cases of long standing empyema of the frontal sinus secondary degenerative changes of the mucous membrane are often found about the orifice of the nasofrontal duct in the middle meatus. The anterior end of the middle turbinated body is frequently found in a state of polypoid degeneration. The point opposite on the septum in the region

of the tuberculum septi sometimes undergoes a similar more diffuse polypoid degeneration, the presence of which Schaeffer considered an important sign in diagnosing frontal sinus empyema. The mucous membrane about the anterior end of the hiatus semilunaris and the infundibulum undergoes sometimes a diffuse, sometimes a more circumscribed degeneration, often giving rise to a cluster of true mucous polyps at that point. A fleshy polypoid mass sometimes develops in chronic cases on the unciform process which forms the lower lip of the hiatus semilunaris. This is often referred to by the Germans as the "lateral schleimhaut-wulst." These secondary changes about the anterior part of the middle meatus should always lead one to suspect frontal sinus disease. It is not possible, however, to base a diagnosis upon their presence, since suppuration of the antrum or of the anterior ethmoid cells may produce quite similar changes.

More characteristic are the appearances about the middle meatus in cases of acute frontal sinuitis. One often sees along the concave edge of the middle turbinated body a red, œdematous area. A drop of cocaine applied to this point will be followed in a few minutes by a partial reduction of the œdema, and often a suspension of a severe frontal headache. The inflation of the sinus by the Politzer method, as suggested by Hartmann, is often followed by as striking a relief as that following the inflation of the middle ear when the Eustachian tube is closed.

A continuous discharge of pus into the middle meatus has been considered a valuable indication of frontal sinus empyema, for the opening, being at the lowest point of the sinus, does not allow the secretion to accumulate. The antrum of Highmore, which also drains into the middle meatus, has its opening at the very top, so that secretion accumulates in the sinus until a change in the position of the head favors its outflow, when it is poured in quantity into the nose. A continuous discharge of pus into the middle meatus may come from the anterior ethmoid cells, the frontal or the infundibular cells as they drain directly into the anterior end of the infundibulum. (See Figs. 2, 3, and 4.)

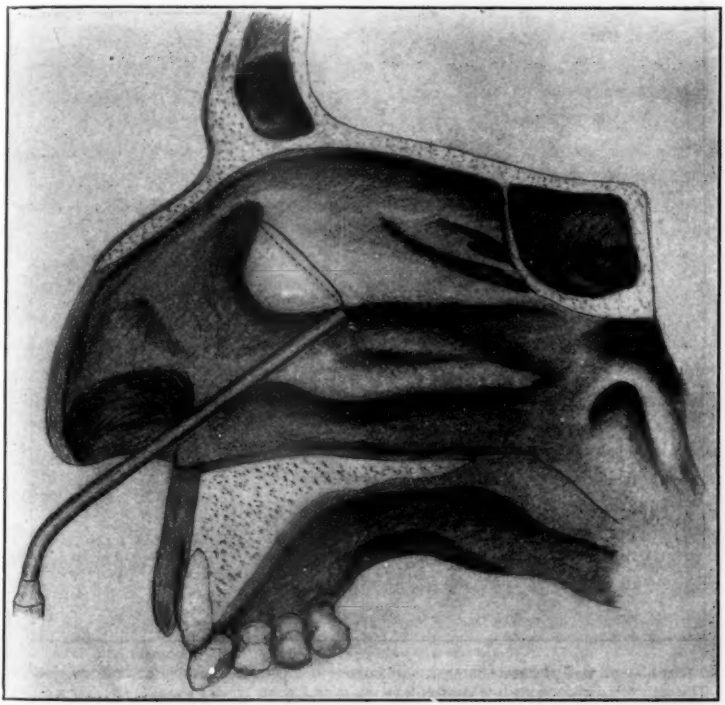
On the other hand, discharge from the frontal sinus is often intermittent when only a limited amount is secreted, giving rise to the well-known morning discharge of pus which accumulates while in the horizontal position. This is followed by cessation of discharge for a number of hours. An intermittent flow may also be caused by a partial obstruction of the duct by polyps. The secretion accumulates behind this barrier until the pressure is sufficient to force open the passage, when a considerable quantity is discharged at once, followed again by a period of retention.

It is evident that whether all of the above symptoms fail in a given case, or whether part or all of them are present, we can neither posi-

tively exclude frontal sinus disease nor positively diagnose its presence. *The final diagnosis of latent frontal sinuitis must rest upon the actual demonstration of pus in the sinus.*

The course taken by pus in its passage from the frontal sinus into the nose is first through the nasofrontal duct into the anterior end of the infundibulum, then through the hiatus semilunaris into the middle meatus. This formation of the passage is the *typical* one, and results

FIG. 1.

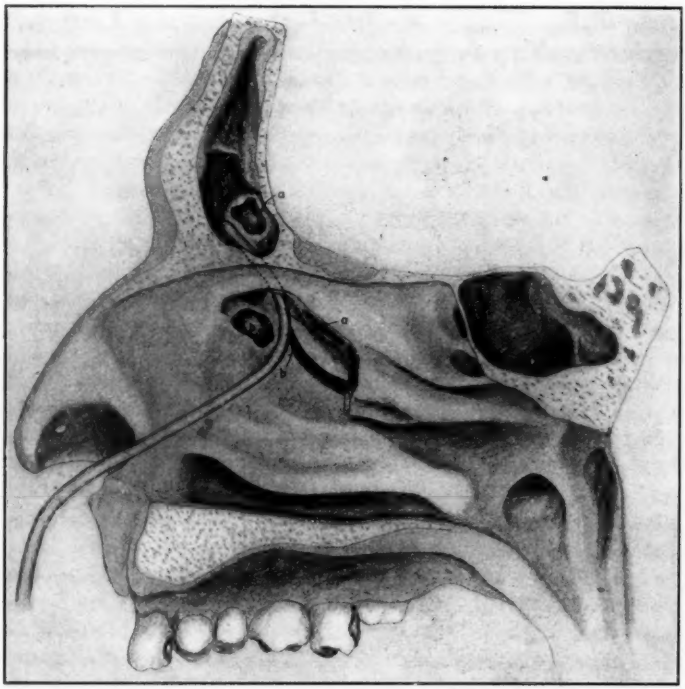


Right lateral wall of nasal chamber, showing method of removing anterior end of middle turbinated body with a wire snare.

from the indirect mode of development of the frontal sinus. (Killian.) In other cases the pus passes directly from the sinus into the middle meatus at a point in front and a little to the median side of the hiatus semilunaris, and has nothing to do with the infundibulum. This is the *atypical* formation or the direct mode of development of the sinus. (Killian.)

In cases where the middle meatus is free from polyps and where the middle turbinated body stands well out from the outer wall, one may proceed at once to the examination of the nasofrontal duct and to the introduction of the catheter into the sinus. In most cases the view into the middle meatus is obstructed by polyps or by a curling under of the middle turbinated body. In such cases the first step is to com-

FIG. 2.



Right lateral wall of nasal chamber with anterior end of middle turbinated body removed. The catheter is introduced into the frontal sinus through the typical passage, which is a continuation of the infundibulum upward and forward.

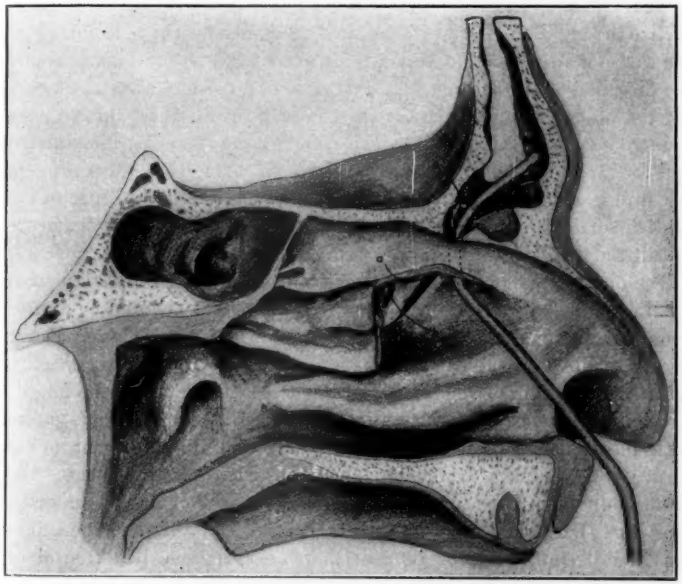
a, *a*. Frontal cell opening into the anterior end of the infundibulum just to the outer side of the ductus nasofrontalis.

b, *b*. Anterior ethmoid cell located in the unciform process and opening into the infundibulum.

pletely remove all the polyps, and if the middle turbinated body obstructs the view into the middle meatus, or prevents the introduction of a catheter, the anterior end of this body should be resected. The resection of the middle turbinated body not only opens the way for the inspection of the middle meatus and the catheterization of the frontal

sinus, but its removal is the key to the conservative intranasal treatment of many cases of frontal sinuitis where, to establish free drainage, the removal of the anterior part of the middle turbinated body is demanded. This operation, so necessary in many cases before the drainage can be established, is accomplished by the use of the cold wire snare. The loop is passed either above or below the body. (See Fig. 1.) When it is impossible to grasp the turbinated body with the snare a notch may be cut in the inferior or anterior border in which

FIG. 3.



Left lateral wall of nasal chamber, with anterior end of middle turbinated body removed. The catheter is introduced into the frontal sinus through the atypical passage, which lies a little in front and to the median side of the infundibulum.

a, *a*. Infundibulum opening into a frontal cell.

b. Typical opening of anterior ethmoid cells.

the loop will catch. The Hartmann conchotome is often found to be a better instrument than the snare for this operation.

With the middle meatus freely opened there are three methods of determining the presence of pus in the frontal sinus:

1. The introduction of a catheter and irrigation of the sinus.
2. The diagnosis by exclusion.
3. Making an exploratory opening into the sinus.

Catheterization of the Frontal Sinus. To be successful in catheterizing the frontal sinus one must be familiar with the anatomy of the middle meatus by the study of sagittal sections of the nose on the cadaver. In the typical formation the anterior end of the infundibulum opens into the nasofrontal duct.[1] The direction of the passage is from below upward and forward. (See Fig. 2.) In the atypical formation the ostium frontalis has nothing to do with the infundibulum, but opens at a point a little in front and to the median side of the hiatus semilunaris. The direction of the passage here is almost straight upward. (See Fig. 3.)

The first step in catheterizing the frontal sinus should be to anæsthetize the middle meatus with cocaine. Before attempting to introduce the catheter it is best to determine the exact location of the orifice and the direction of the passage with a flexible blunt-pointed probe. Bending the probe one inch from the tip at about a right angle upward, try to introduce it by the typical passage through the infundibulum upward and forward. (See Fig. 2.) If this fails, try to reach the sinus through the direct or atypical passage at a point in front and a little to the median side of the hiatus semilunaris, changing the curve of the probe to suit the direction of the passage in the particular case.

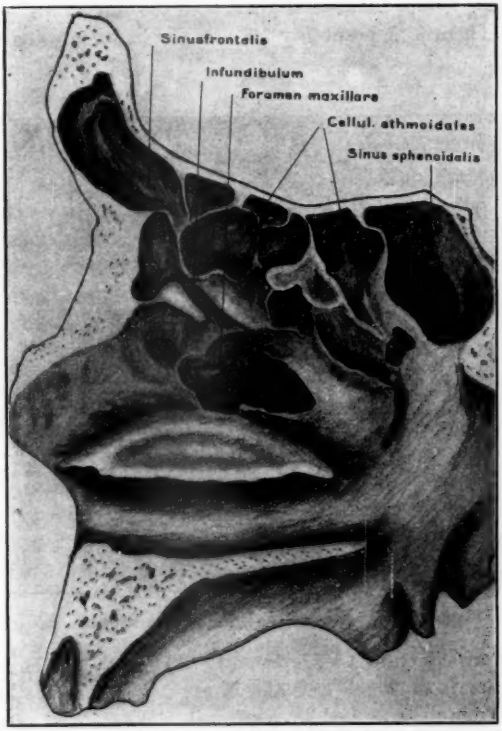
The obstacles one encounters in passing a sound into the frontal sinus are, in the first place, the conditions which obstruct the middle meatus —namely, a curvature of the septum narium, the anterior end of the middle turbinated body, and masses of mucous polyps about the meatus. After the resection of the middle turbinated body, and with the middle meatus freely open, there are still obstacles which sometimes interfere with the passage of a sound. A very narrow infundibulum or an excessively large bulla ethmoidalis may obstruct. In some cases the infundibulum opens into a frontal cell and does not enter the sinus. (See Figs. 3 and 4.) In other cases where the infundibulum opens into the frontal sinus there are one or more cells, the so-called frontal or infundibular cells, which open into its anterior end. (See Fig. 2.) It may readily happen that the probe enters one of these cells in place of the frontal sinus. In such cases, where the frontal sinus opens into the infundibulum together with other cells, the opening into the sinus, as a rule, lies nearest the septum narium. (See Fig. 2.) To avoid entering a frontal cell the rule is to bend the tip of the sound slightly inward. To introduce the sound in a difficult case often requires many trials at repeated sittings. In other cases, especially in the atypical formation

[1] The application of the term ductus nasofrontalis to the passage leading from the frontal sinus into the nose, if taken to signify the existence of a canal having a certain length between the opening into the sinus and that into the nose, is not strictly correct, for often, especially in the atypical formation of this passage, no true duct exists, but the frontal sinus opens into the anterior part of the middle meatus through a simple ostium.

of the passage, one is often surprised at the readiness with which the sound slips into the sinus.

The introduction of a catheter is a comparatively simple matter after the location and direction of the passage have been determined by the probe. A soft silver catheter is bent to correspond exactly to the curve of the probe, and is introduced at the point where the probe had entered.

FIG. 4.



Right lateral bony wall of nasal chamber, showing infundibulum opening into an anterior ethmoid cell.

To ascertain whether the catheter has actually passed into the frontal sinus is sometimes quite difficult. The ability to feel the instrument scraping against the anterior wall of the sinus has been reported by Engelmann in four cases.[1] I have never been able to verify this. The method of measuring the distance the catheter has been intro-

[1] Arch. f. Laryng., Bd. i., S. 312.

duced into the nose, and of placing it for comparison along the side of the nose, may be deceptive, for the course of the catheter within the nose is oblique, while on the outside it is more vertical, and the impression is readily given that the instrument has passed into the frontal sinus when the tip has really lodged in the infundibulum or in a frontal cell. (See Figs. 2 and 3.) To ascertain the position of the point of the probe, Struycken[1] has used a compass after magnetizing the point of the probe. To determine whether the catheter has passed into the frontal sinus I have for several years used the X-ray, with satisfactory results.[2] There is a possibility for error even when using the X-ray.

FIG. 5.

Skiagraph showing position of catheter in frontal sinus.

The catheter may enter a large frontal cell (Fig. 2), the bulla frontalis of Zückerkandl, in which case the X-ray might give the same result as if the frontal sinus had been entered. We can in some cases be sure that the catheter is not confined in a frontal cell when we are able to rotate the tip freely, for this shows that it has lodged in a large sinus. *In cases where this experiment fails we have no means of determining whether the point of the probe is in the sinus or a frontal cell.* The skiagraph (Fig. 5) shows the position of a catheter in the frontal

[1] Arch. f. Laryng., Bd. ii., S. 154.

[2] The application of the X-ray for diagnosing conditions in the frontal sinus was suggested by Max Scheier in 1897 (Arch. f. Laryng., Bd. vi., S. 57). In 1899 Gustave Spiess used it for directing a burr while opening the sinus from the nose (Ibid., Bd. ix., S. 285). Glatzel, in 1900, used the X-ray for locating the position of a probe in the frontal sinus (Ibid., Bd. xi., S. 155).

sinus. This skiagraph was taken of a man who had suffered for many years from purulent discharge from the nose. After the resection of the anterior end of the middle turbinated body and the removal of a large number of polyps from the middle meatus the catheter was introduced and a large quantity of fetid pus was washed out of the sinus. With the catheter once in the sinus it is a simple matter to irrigate the cavity and examine the water for the presence of pus. A single negative result cannot be considered conclusive, but repeated examinations must be made before the possibility of a latent suppuration can be excluded.

Diagnosis by Exclusion. The number of cases where, for anatomical reasons, the catheter cannot be passed into the frontal sinus is greatly reduced by the resection of the anterior end of the middle turbinated body. There are still, however, certain cases where the catheter cannot be introduced. In these cases the method of making a diagnosis by exclusion may be tried.

The maxillary sinus and the anterior ethmoid cells as well as the frontal sinus open into the middle meatus. Pus found in this meatus may have come, therefore, from one or all of these cavities. To determine whether a part or all of the pus comes from the frontal sinus we proceed first to eliminate the maxillary sinus. This is done by irrigating the sinus either through its normal opening or by introducing a curved trocar just above the inferior turbinated body. The point of the trocar should be directed down and outward in order to avoid the orbit.[1] After the sinus has been washed out the nose is thoroughly cleansed with a pledget of cotton. The patient is now allowed to wait ten or twenty minutes. If pus is again found in the middle meatus it must come either from the anterior ethmoid cells or the frontal sinus. The opening into the anterior ethmoid cells, placed in the angle between the bulla and the base of the middle turbinated body (Fig. 3), is separated far enough from the ostium frontalis so that pus coming from the former can often be distinguished from that coming from the opening of the nasofrontal duct.

In latent empyema the discharge from the frontal sinus is often intermittent, due to a partial obstruction of the duct or to the slight amount of pus secreted. In such cases, therefore, where the pus does not reappear after cleansing the nose a piece of dry gauze may be packed about the ostium frontalis and left there for several hours, or even overnight. Upon its removal, if any pus has exuded from the frontal sinus, the gauze will be marked with it. A negative result, just as when catheterizing the sinus, cannot be considered conclusive until repeated examinations show its absence. In making a diagnosis by exclusion,

[1] Study of the Anatomy of the Maxillary Sinus, with Special Reference to Points of Practical Interest. G. E. Shambaugh, Chicago Medical Recorder, 1898, vol. xiv. p. 398.

suppuration from the frontal cells which open into the infundibulum will give the same results as that from the frontal sinus.

Exploratory Puncture. In cases where the sinus cannot be catheterized, and where the method by exclusion fails to give satisfactory results, we have still at our command, as a last resort, a means of arriving at a diagnosis by making an exploratory opening into the sinus. An intranasal opening has been made by Schaeffer by boring with a narrow, sharp spoon through the floor of the sinus, between the middle turbinated body and the septum. The opening must be made well in front, to avoid breaking through the cribriform plate into the brain cavity. Others have directed a trocar from the middle meatus upward and outward into the sinus. Spiess[1] has used the X-ray for guiding a burr through the floor of the sinus. The danger of entering the brain cavity in puncturing the sinus from the nose is so great that few specialists care to undertake it. An unfortunate case is related by Grünwald,[2] where a Parisian specialist, suffering from what he supposed was an acute attack of frontal sinuitis, attempted to open the sinus himself through the nose, and died four days later from meningitis.

When the symptoms demand an exploratory opening of the frontal sinus the safest method is to make the opening from without. It requires but a small incision, which can be made under the inner end of the eyebrow, where the slight scar will not be seen. It is well to get the consent of the patient to complete the operation of cleaning out the sinus in case pus should be found.

CAUSES OF SALPINGITIS OTHER THAN GONORRHŒAL.

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In approaching this subject two phases present themselves, the surgical and the sociological. From either point of view the subject is of interest, and the sociological is of no less importance, if not of more, than is the surgical. There is an idea very prevalent among the laity, due perhaps to a careless manner of speaking among the medical profession, that salpingitis and pyosalpinx have their origin alone in gonorrhœa. This conviction is so deeply rooted in the minds of the laity, and in a great measure in the minds of physicians, that it is difficult to alter.

[1] Loc. cit.

[2] Die Lehre von den Naseneiterungen, München, 1896, p. 132.

It is true that the great majority of cases of salpingitis are of gonorrhœal origin, but yet from a sociological stand-point the recognition that there are other causes is most important.

To so great an extent is this view prevalent that many women who have this trouble are grossly misjudged, and their disease is considered one for which they are in great measure responsible, and, therefore, not deserving of the sympathy that would otherwise be accorded them.

The general recognition that there are causes of salpingitis other than gonorrhœal is especially important to innocent husbands and unmarried women, for in many instances are these members of society done a great injustice in the minds of the community. It may be said in reply, that the existence of other causes is well known; but yet, in spite of this knowledge, we think that we are justified in holding that there is a careless manner of thinking and speaking in the profession that is capable of doing a great deal of harm.

Perhaps we have gone out of our way to call attention to the sociological aspect of this subject, yet, nevertheless, we believe it is of great enough importance to be worthy of our attention.

Just how great a proportion of the cases of salpingitis and pyosalpinx are of gonorrhœal origin is very difficult to determine. The proportion has been placed by various eminent authors all the way from 20 to 80 per cent. Such a wide discrepancy in their conclusions is in itself enough to show how difficult is the true percentage to determine. At the time these cases come to operation the disease has usually been long established, and cultures, as is well known, commonly show no growth, or, if successful, a doubt remains as to whether the micro-organism found is the one which caused the trouble or is only present as a secondary infection. The difficulty of growing the gonococci also greatly interferes with our statistics.

Under the microscope the tubercular cases can be differentiated, and in some cases the gonorrhœal can be separated from those caused by the other pus-producing micro-organisms. This latter differentiation, however, can only be surmised rather than definitely and certainly determined.

The causes of salpingitis other than gonorrhœal that have been especially called to our notice are post-puerperal infection, appendicitis, and tuberculosis, and we may add, as an existing cause of acute exacerbations, minor gynecological operations. These causes are operative in frequency, probably in the order named, and we will briefly discuss each of them.

One of the most important causes of this trouble is what may be well called the "terrible douche habit." The douche is often a remedial agent of great value, and if properly and not too frequently used is entirely harmless; but its indiscriminate and careless use is greatly to

be deplored. By its too constant use the vagina is robbed of its natural protection against infection, and carelessness in asepsis often implants an infection of the utmost gravity. We believe that there is hardly one of our readers of any considerable experience in either a general or a gynecological practice who has not seen at least one case of endometritis or salpingitis that he has attributed to the unsurgical use of the douche. Personally, so many of these cases have been met with that we are afraid of a fountain syringe, and feel it our duty to warn our patients against this apparently harmless procedure. The careless use of the douche in one instance in our knowledge was responsible for a severe gonorrhœal infection in an entirely innocent woman. In a reprehensible manner the douche was allowed to hang in the bath-room and was used by a servant who had a virulent gonorrhœa, and its subsequent use by her mistress resulted in her contracting the disease.

Minor gynecological operations are responsible for many acute exacerbations of latent disease of the tubes, and it is our opinion that the question whether a cervix should be repaired or dilated, or a uterus curetted, calls for as much or more experience than any other operation in gynecology. A dilatation of the cervix for the cure of dysmenorrhœa or sterility is done often with practically no thought of the dangers; but in too many instances this slight operation is followed by the most distressing consequences. Besides the element of danger in these cases the chances of cure are so uncertain that a dilatation should not be done without the most careful consideration. All authorities give salpingitis as a contraindication for these procedures, but the great difficulty lies in definitely determining that a moderate latent salpingitis does not exist.

Some years ago the practice of introducing a sound into the uterus for methods of diagnosis and uterine applications of Churchill's tincture of iodine and other drugs was much in vogue in office practice. Of late years intrauterine applications in the office have become much less popular with the majority of practitioners, on account of their dangers as well as their lack of efficiency. During the past year there have been published, by German surgeons, elaborate technique of intrauterine treatment for use in the office; one man even going so far as to advocate curetting in the office, and allowing the patient to go home in an hour or two afterward. Already there are beginning to appear in American medical journals reports of series of cases treated by these methods. This we deplore as a step backward and not forward in medicine, for if our modern experience in aseptic surgery teaches anything, it should teach that a woman with a piece of gauze in the uterus, or immediately after a dilatation and curettement, is in too great danger of infection to permit her to go about on the streets or carry on the usual vocations of life.

Post-puerperal infection is undoubtedly responsible for many cases of salpingitis, and calls to our minds the trite statement that if it were not for bad obstetrics there would be very little gynecology. The post-puerperal cases may develop directly after labor, or after a long interval. In the latter cases an endometritis alone develops at the time of labor, which may be mild in character and occasion very few symptoms, but which subsequently results in a salpingitis.

We hardly dare say in the majority, but certainly in a large percentage of cases of appendicitis in the female is the right Fallopian tube infected. Indeed, in a case of periappendicular inflammation it is hard to see how, from its anatomical position, it can escape becoming infected. Not only are the two structures so close in their anatomical relations, but also the communication by their lymphatic channels is so free that the transmission of infection from one to the other is to be expected. In many cases there is direct lymphatic and vascular connection by means of the appendiculo-ovarian ligament of Claudo. Through this free lymphatic connection we sometimes find the right tube and ovary seriously involved in mild grades of appendicitis, making the primary cause of the salpingitis hard to explain but for the knowledge of this connection.

Tubercular salpingitis is occasionally met with and arises in two ways, either secondary to tuberculosis in other parts of the body, or from direct implantation from tuberculosis of the seminal vesicles, testicle, or prostate. In forty consecutive cases of salpingitis subjected to microscopical study at the German Hospital tuberculosis was found but once. Of course, this is not a large enough series of cases to determine with any degree of accuracy the percentage of tubercular salpingitis, yet it is our opinion that it does not occur much more frequently than our figures would indicate.

AN EXPERIMENTAL INVESTIGATION OF PUERPERAL PYÆMIA.

By F. W. Gaertner, M.D.,
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When we follow up the investigation of the development of pyæmic diseases it is, without doubt, only by the progress of bacteriology, by its enlarged and improved methods of examination, that clearness, system, and experimental confirmation has been infused into vague, unsatisfactory ideas and suppositions.

Kehrer, in his thesis on *Diseases of Childbed*, says, in paragraph 89, that pyæmia in puerperio is due to a phlebitis of the placental

veins or the veins of the wall of the uterus. Occasionally it originates from inflamed veins of the vagina or of the external genitals—the vena cruralis or saphena. From these primary sources of infection pus or thrombi containing pus pass into the bloodvessels and cause those secondary symptoms which are characteristic of pyæmia.

This theory of the origin of pyæmic infection is generally accepted, and will probably remain so for all time. But what kinds of bacteria cause pyæmia, and what are the conditions upon which the different degrees of pyæmic infection depend? It is upon these two points that opinions are divergent.

Some years ago the writer proved, in "A Contribution to the Study of Septic and Pyæmic Infection of the Uterus," that the origin of pyæmia and sepsis is not due alone, first, to the staphylococcus, and, second, to the streptococcus, and that these cocci are not confined to certain definite places of entrance into the system, but that each of these two kinds of bacteria, no matter whether they penetrate by lymph-vessel or bloodvessel, or by both at the same time, are able to cause pyæmia or sepsis. This is apparently directly in opposition to the result of the histological study of puerperal endometritis by Bumm, who in all his experiments found only the streptococcus. The apparent contradiction of these two results is due, undoubtedly, to accidental occurrences, and proves most conclusively that neither pyæmia nor sepsis is caused from only one of these bacteria. Kehrer had previously warned against the theory that the streptococcus is the only bacteria which causes puerperal fever. He, on the contrary, believes this fever to be caused by both staphylococci and streptococci. Hahn confirms this by his paper on "Post-mortem Diagnosis of the Septic and Pyæmic Processes." Out of fifteen fatal cases of sepsis and pyæmia he could find both streptococci and staphylococci as the cause of the puerperal infection.

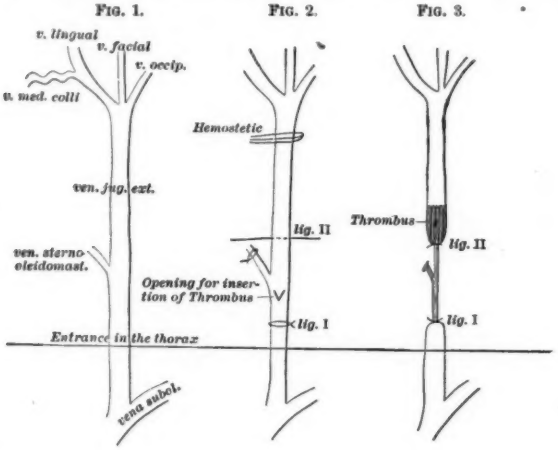
Preiyer adds to this result, in his bacteriological investigations of some cases of puerperal fever, by finding in the pus of seven cases of puerperal pyæmia both streptococci and staphylococci, but principally the latter. Mixius confirms the same, and proved, by cultivation, staphylococci and streptococci in the pus taken from different organs, and also in the blood of six fatally terminating puerperal fever cases. Rubecka also, in his "Contributions to the Pathogenesis of Purulent Puerperal Diseases," obtains the same result. From a series of further publications —Cornil, Babes, Levy, etc.—in which they name only the staphylococcus or streptococcus as being present in pyæmia, I select only that of Baginsky, because it best illustrates how cautious one must be about accepting the majority of the reports of "found" bacteria. The story is best told in the author's own words: "The bacteriological examination was done according to Koch's method. In the test-tubes was placed

agar-agar which had been infected directly from the corpse; on this, after having been two days in the incubator at 35° C., there were little whitish substances, resembling pearls somewhat. They were in groups or ridges, which were only raised a very little from the surface of the cultivation mass. The microscopical examination showed a pure culture of a small, round coccus, which was easily stained by fuchsin, gentiana, and Gram's method. In another test-tube of the same infection there were, after twenty-four hours' exposure, numerous colonies, which looked like very small pearls, and besides these there was a white, straight line, elevated above the surface a little. This line of bacteria represents the place where the infection was made with the platinum loop. In the condensed water of this tube a whitish mass was easily perceived. In all the cultures the microscopical examination proved successful, the result each time being to find cocci formed into chains and heaps." He who practices bacteriology even in a small way must find this way of investigation doubtful, to say the least; because it is a real mistake, according to our knowledge of bacteriology to-day, if a fluid which is to be examined for its germs is not mixed with agar or gelatin and spread on a plate. In an agar-culture made in a test-tube by merely infecting it with a platinum loop one never succeeds in isolating different germs, which are always to be presupposed in a bacteriological investigation. If Baginsky, in spite of this, had found a unitary growth of both cultures, even then he would not have proved that one germ did overgrow another; but, as Baginsky describes in the second culture, a growth which is not characteristic of the streptococcus, but rather of the staphylococcus, because in his further microscopical investigations he found little heaps of cocci, as well as little chains, there is no doubt that Baginsky presented a mixed infection of two cocci as a unitary one. Although the theory that the staphylococcus and streptococcus are the causes of pyæmic diseases predominates almost exclusively, yet contrary theories may only be repudiated by reasons gained from experience. The experimental proof of this theory is still lacking. It therefore shall be my task to advance the proof that the origin of pyæmic diseases is, indeed, independent of the immigration of different kinds of pus germs; that it is sufficient if either staphylococcus or streptococcus, or both at the same time, develop their inflammatory properties.

The first step toward advancing this task was the question, "How may we produce the same symptoms in animals that appear in the pyæmic infections in man?" In other words, how is it possible to create by embolic processes infectious thrombosis, phlebitis, and suppuration in tissues adjoining the entrance of infection, and in more distant organs?

Judging from the knowledge that the cause of a pyæmic infection in

puerperio generally is due to an infectious thrombus of a vein of the placenta, and that after operations pyæmic symptoms take the same course as puerperal diseases, I tried the following experiment: I brought an artificial thrombus charged with pus cocci into a vein of the test animal, without infecting the surrounding tissue. In all my experiments I used the vena jugularis externa of dogs and rabbits as test animals. The technique for the three kinds of thrombi infected and charged with streptococcus or staphylococcus, single or united, was the same, and may therefore be described in advance, and thus avoid the description of each infection of each animal. The vena jugularis sinistra of all the test animals was laid open from the place of confluence of the facial and cranial veins to the thorax, where the vena jugularis was ligated permanently, while the place where the facial and



cranial veins flow together was closed only temporarily by a hæmostat. The branches of this hæmostat were protected by rubber tubes, to avoid injuring the walls of the bloodvessel. The artificial thrombus was placed one-half inch below the ligature. In rabbits this is above the inosculation of the vena mediana colli and the jugularis externa; in dogs, just below the inosculation of the vein coming from the musculus sternocleidomastoideus. This latter vein is also ligated permanently. A sterilized silk thread was now placed under the vein, the vein opened, the thrombus pushed in peripherally, and the vein reclosed with the same silk thread. In removing the hæmostat at the temporary ligature the vein was instantly filled with blood up to the thrombus. The external wound was now carefully closed with silk. This entire operation was performed aseptically, all disinfectants being avoided.

The selection of the material for the artificial thrombus was attended with great difficulties. First, I tried thrombi from agar-agar infected in small glass tubes of the same diameter as the vena jugularis. After filing off the bottom of the small test-tubes the agar-agar thrombus was pushed into the open vein by a sterilized glass rod. Here I was obliged to discontinue the use of this material, because the agar-agar was absorbed too quickly, and thus a main momentum of the nature of a thrombus was absent. The natural thrombus, as a solid mass before its final softening, keeps the bloodvessel filled with blood for a certain length of time; but the quick absorption of the agar-agar in connection with blood did not resemble the reality. To avoid this disadvantage the entire test-tube (one inch long), charged with agar-agar culture, was sterilized half an hour each day for three successive days at 60° C. and then inserted in the vena jugularis. But the advantage of this solid artificial thrombus was offset by the disadvantage that the part of the infected agar-agar which came in contact with the blood was too small to have a proper infectious result. After some further fruitless experiments to find a proper material for the artificial thrombus I finally found that a round cotton wick of the same diameter as the vena jugularis would answer the purpose best. Pieces of wick one-third of an inch long were first carefully sterilized, then charged with a bouillon culture of pus germs, and dried in an exsiccator over H_2SO_4. To protect these pieces of charged wick from any outside infection, and to render their insertion in the vein easier, I gave them a thin coating of gum arabic. Dried once more in an exsiccator, they became as hard as stone. To prove whether these artificial thrombi were free from any other germs than those used for infection, several were selected from the series, put in bouillon, and kept for twenty-four hours in a thermostat at 37° C. Plate-cultures spread with this bouillon placed under aërobic and anaërobic conditions and microscopical examination revealed their purity. Further experiments with these thrombi proved that their composition was a successful one, and their effect came nearest to the one of a natural thrombus. Having completed these preliminary investigations, I started with the main experiments to demonstrate that puerperal pyæmia is solely due to infectious thrombi, no matter what kind of pus germs are in question.

Experiment 1. Large, full-grown dog. Thrombus with staphylococcus pyogenes aureus from fresh carbuncle pus inserted in the left vena jugularis externa nine hours after its completion.

Five days later dog refuses to eat; has an unsteady, tottering gait; three days later dog was found dead.

Autopsy. Vena jugularis externa sinistra ligated one-half inch above the entrance in the thorax. Centrally from this ligature the bloodvessel contains fluid blood; peripherally the vein is obliterated up to the second ligature. Starting at the second ligature a two and one-half inch long

softened thrombus up to the inosculation of the vena lingualis, facialis and occipitalis. From here on the veins again contain fluid blood. Other organs normal. In the median third of the sulcus centralis of the left hemisphere of the cerebrum was an abscess, the size of a hazelnut, which destroyed the pia mater of the lobus parietalis and frontalis and penetrated into the brain substance of the lobus parietalis and frontalis. Pia mater, about one-half inch in the circumference of this abscess, inflamed. Dura mater normal. From this abscess, from the pulp of the spleen, from the heart's blood, and from the softened thrombus, staphylococcus pyogenes aureus could be proven in pure culture, microscopically, and by plate-cultures. The thrombus was carefully hardened in alcohol, and together with the walls of the veins and the surrounding tissue examined according to Gram's method and alum carmine. Result: Walls of the vein thickened, infiltrated, and partially necrotic; vasa vasorum filled with staphylococcus; thrombus consisted of detritus containing staphylococci and a few red and white blood-corpuscles; surrounding tissue infiltrated, necrotic, and populated by numerous staphylococci. The microscopical examination of the hardened spleen showed that some lumina of its bloodvessels were filled with staphylococci.

It would become too tiresome for the reader if all our eighteen experiments were told as minutely as Experiment 1. The writer, therefore, thinks it sufficient when he reports in general the course which each one took:

Insertion of infected wick thrombus; reports of symptoms which the animal shows after operation up to its death, which occurred on the tenth day after the insertion, with chloroform; in all cases the animal did not die earlier. Examination of the pus germs found in thrombi, etc., upon their identity with cocci used for infections by plate-cultures and microscopically. Autopsy: Report of thrombus found in vena jugularis externa, whether perivascular inflammation and pus formation occurred; report of embolic abscesses in different glands, etc.; state of different organs. Thrombus with vein, surrounding tissue and spleen hardened in alcohol, and sections stained with alum carmine and Gram's method; microscopical examination of sections.

From the tabulated compilation may be learned what kind of animal the writer used, the kind and origin of germs, how often they passed through agar-agar before use, how soon the artificial thrombi were used after their completion, their identity with the germs originally employed for infection of the inserted wick thrombus, and, finally, the result of the infection ten days after insertion of the thrombi.

From our experiments, and especially from their tabulated compilation, we learn that the results of the insertion of thrombi in the vena jugularis externa are the same for staphylococcus pyogenes aureus and streptococcus pyogenes alone or when combined. Thrombosis of the vena jugularis externa is common to all cases; now more, now less extended; now confined only to the main branch of the jugularis; now

spreading over a large number of the veins of the head and face; a thrombosis the thrombus of which is either entirely softened, or shows only signs of decay, or produces itself as a clear thrombosis, with or without any transformation by bacteria.

In all the cases a phlebitis was connected with the thrombosis, the intensity of which depended upon the degenerative changes of the thrombus.

In Experiments 3, 7, 10, and 14, in which the thrombus underwent no degeneration, for reasons which I will explain later, there was a mere thickening of the walls of the bloodvessel, with more or less infiltration of it and the surrounding tissue. In all the other cases where the substance of the thrombi passed through all the steps of a purulent softening the inflammatory changes of the walls of the blood-vessels were accordingly increased. Dense infiltration of the thickened wall of the vein and of the surrounding tissue with pus-corpuscles, necrotic decay, and suppuration are now the common pictures. These, stained by Gram's method, show cocci varying greatly in number. In other words, we have macroscopically and microscopically a pronounced thrombophlebitis purulenta, the true companion of a pyæmic infection.

The accurate microscopical examination of these eighteen cases gives the writer a certain privilege to participate in the discussion of Metschnikoff's theory of phagocytosis. Just by these microscopical slides, concentrated in a small and easily controllable space, which were at my disposal, the facts to be disclosed were: The effect of bacteria, the changes made by bacteria, and, above all, that arrangement of protection which Metschnikoff supposed existed in the consuming of the bacteria by leucocytes. Not in a single case, nor in one of the numerous cuts of any case, could it be observed that a coccus was enclosed in the cells of the innumerable leucocytes. On the contrary, it appeared to the writer, after the present and previous observations, that the leucocytes were eaten by the bacteria—*i. e.*, that the bacteria caused their decay.

This is a long known and forcible contradiction of the theory of phagocytosis—that hand-in-hand with the multiplication of the bacteria within the zone of the leucocytes there is also a decaying of these bacteria; it is just in the detritus where the most bacteria are noticed. This decaying effect of bacteria in the leucocytes was proven experimentally by Loewit. Our microscopical observance is therefore in the best accordance with the natural process, which I will explain later.

Although the writer, as a result of his microscopical examinations, is placed on the side of the opponents of Metschnikoff's theory of phagocytes, he will yet admit, with other authors, that a certain value has to be conferred to the leucocytosis in infectious inflammation. But this advantage does not lie in a mere mechanical effect, as Bumm

thought to be able to prove—that the "rampart" of leucocytes around the centre of an inflammation is impermeable to bacteria (the writer himself, in a previous communication, proved this to be wrong, by directly contrary results from examination)—but, according to Buchner, in a chemical effect.

Above all, the bacteria, after their content becomes nascent by decay of their cells, act attracting—*i. e.*, chemotacticly on the leucocytes, as we learn from the experiments of Leber, Buchner, Janowksi, etc.; then they act as solvents—leucolytic—on the same; and, finally, perish in their own composition. (Baumgarten, Hoenfeld, and others.)

The latest efforts of Metschnikoff to sustain his theory of phagocytosis are also not effective enough. If Metschnikoff quotes against the main opponent of his phagocytosis—against the theory of the microbicide power of the blood-serum—that the same was only studied in diphtheria and tetanus (two diseases where the resorption of the locally produced poison is prevalent), and not on septicæmic diseases, the writer needs only refer to the experiments of Reichel, Brieger, Frankel, Everard, Szekely, and Szana in order to disarm this allegation; for not only at septic general infections, but also especially at pyæmic local infections, it is confirmed beyond any doubt. By the microscopical examination of Experiments 3, 7, 10, and 14, I am further able to support the theories of Virchow and Aschoff, in opposition to the French school, that thrombosis is the primary process and phlebitis the secondary one. The writer could recognize without any difficulty in the above cases that the farther and fresh end of the thrombus was still surrounded by a normal wall of the vein, while already, a few millimetres distant from it, thickening and infiltration of the blood-vessel occurred. Thus this result of examination again is an affirmation for the fact that the progressing thrombosis of a bloodvessel is not the consequence of an inflammatory change of the wall of the bloodvessel, but independent from it, due only to a chemical process of the blood itself.

Because in none of our eighteen experiments there could be found any embolic-pyæmic processes in the lungs the writer failed to confirm the remarkable presence of hyaline emboli in the ramifications of the arteries of the lungs, especially in cases of specific fatal character as are described from Litter, Heller, and Deutsch. The obstructions of the bloodvessels in the spleen which were observed in our fatally terminating cases—1, 6, and 8—are of a more bacteritic nature and caused by the same cocci which were used for the infection.

Resulting from thrombophlebitis purulenta we note in all the eighteen cases perivascular inflammation from serous saturation extending to purulent reduction of the tissue. Not only staphylococci and streptococci alone, but also both combined, produced those changes of

tissue which in pyæmic diseases find their cause in the wandering of the cocci through the wall of the bloodvessels and their penetration in the surrounding tissue.

Embolic abscesses and suppuration of glands reach in our eighteen cases the percentage of 44.5 per cent., of which three ended fatally—17 per cent. The transportation of these emboli occurred into different organs. In four cases there was parotitis, and in three others the glandula submaxillaris sinistra suppurated; in one case there was an abscess in the left hemisphere of the cerebrum, in one case a meningitis purulenta, and in one an abscess behind the left ear—processes which do not permit any other explanation than of an embolic origin, because in all these suppurations the same cocci as those used for infection of the artificial thrombi could be proved as a pure culture. In the three mentioned fatal cases there could still be found a general infection of the blood, since in the blood of the heart and in the pulp of the enlarged spleen there could be cultivated the same cocci as there were in the embolic abscesses and in the thrombus of the vena jugularis externa.

Transferring these results of investigation to pyæmia in puerperio, we come to the conclusion that the transformation of the physiological formation of thrombi into a pathological one, as in thrombophlebitis purulenta, is principally due to the presence and effects of pus germs. The recent theory of the coagulation of the blood furnishes a decided confirmation to the above results of our experiments, and the writer therefore takes advantage of quoting its principal points, which are of importance in order to understand the statement of the deleterious effect of the cocci.

The thesis of Alexander Schmidt, the founder of the theory of the coagulation of the blood—"without leucocytosis no coagulation of the blood"—experienced an extension: "The colorless blood-corpuscles are not the only cause for coagulation of the blood, but they accelerate in an eminent degree, by their extracorpus-deriving effect, a process already in operation; this process would be brought to a termination also without the colorless blood-corpuscles, by the disengagement of the fibrin in the blood separated from the organism;" because the filtered, from all corpuscular elements eliminated, blood-plasma of the horse also coagulates, though a little slower than the blood which contains cells. This is not at all in contradiction with the theory of Pekelharing and Lilienfeld, which will be quoted later, because Alexander Schmidt admits that the constituent elements for coagulation which are present in the blood in a dissolved condition derive themselves from cells and come from there in the blood.

Schmidt derives fibrinogen by a process of dissolution from a body higher than albumin—from cytin, the radical of the protoplasma; but Schmidt was only able up to now to transform the cytin, by dissolution,

into cytoglobin and preglobulin, and by co-operation of these two into paraglobulin. Fibrinogen, which he derived from paraglobulin only speculatively, is just this constituent element for coagulation which Schmidt was unable yet to obtain directly from paraglobulin.

Still more hypothetic is the derivation of fibrin ferment, the "thrombin," which is said to develop from another constituent of cells, the prothrombin by the influence of zymoplastic substances. Schmidt admits but recently that the elementary bodies which are present in each cell may act in plasma free from ferments, either promoting or hindering the coagulation. The latter substance he found in his cytoglobin. The same observations of Schmidt we already meet in a publication of Wooldrige, in the year 1890, who found that fibrinogen of tissue, injected intravenously or intra-arterially, caused at first an increased and then a diminished capability of coagulation of the blood. Wright, who extended Wooldrige's experiments, could analyze his "tissue-fibrinogen" into two albumoses — a protein which hinders coagulation, and a nuclein which favors it.

The investigations of Pekelharing "About the Importance of the Lime Salts for the Coagulation of the Blood" explains, further, "that the fibrin ferment—the 'zymogen' of Pekelharing—is a chemical compound of lime, which is able to transfer lime to the fibrinogen, so that from the soluble fibrinogen there is originating an insoluble lime-like compound of albumin, the fibrin."

Pekelharing found in this compound of lime and albumin as an organic component a nucleo-albumin, which he also could educe from it, and which originates by decay of the leucocytes. These give up their plasma to the nucleo-albumin and combine with the lime which the plasma contains.

A valuable confirmation of this theory of coagulation are the experiments of Loewit about the decay of the leucocytes—the leucolysis, by intravenous and intra-arterial injections of hæmialbumose, peptone, pepsin, nuclein, extract of leeches, pyocyanin, tuberculin, curare, urea, uric acid, and urate of sodium. Of these substances the albuminoids, inclusive of the proteins of bacteria, proved the most effective leucolytic ones. Exceptionally these injections brought about thrombosis, but the same could be produced on a large scale by the injection of several cubic centimetres of a 1 to 2 per cent. CaCl solution in the venous system after having injected the albuminoids.

Arthur and Pagis proved that blood mixed with small quantities of oxalate of lime—by which chemical process the lime in the plasma precipitates—becomes uncoagulable. With an admixture of chlorcalcium this blood, free from lime, coagulates again. Hence the fibrin is a lime-albuminate. Also, Freund accedes to the same opinion, that the formation of insoluble phosphate of lime has to be looked upon as

the essential and exclusive cause of coagulation of the blood. Griesbach, too, agrees that coagulation of the blood depends upon the plasmoschisis—*i. e.*, the decay of leucocytes in combination with calcareous substances.

It cannot be denied, says Griesbach, that there is indeed calcium oxide present in the plasma, as Pekelharing supposed; but it cannot be overlooked that, also, the amœboid cells—this at least tallies with the blood of astacus fluviatilis and of the invertebrates—are abounding in calcium oxides, and that, therefore, the products of decay of cells represent already compounds of calx and albumins which were formed either very quickly or in which the calcium atom was present *a priori*.

The chemical process of coagulation of the blood becomes still more obvious by Lilienfeld's "hæmatological searches." Out of a water extract of leucocytes (thymus, lymph glands) Lilienfeld could precipitate by acetic acid and alcohol a substance of constant compound —the nucleo-histon—which, again, by addition of mineral acids is decomposed into nuclein and a substance free of phosphorus, "the histon," already formerly discovered by A. Knopel in the red and white blood-corpuscles of birds.

This nuclein, even as the thrombin of Schmidt or as the nucleoalbumin of Pekelharing, promotes coagulation in all fluids capable of coagulation, and intravascularly injected produces wide-spread thrombosis.

Histon has the property of an albumose, and therefore intercepts coagulation, and that in such an exclusive way that in blood gained by bleeding and mixed with histon the morphological elements are, after twenty-four hours, still as unchanged as in circulating blood.

Nuclein and histon, acting together as nucleo-histon, are also hindering coagulation. Nucleo-histon can be analyzed not only by mineral acids, as mentioned above, but also by lime-water; and it is just this analysis in histon, its compound with calx and the consequently nascent nuclein, which causes coagulation, that the process of coagulation is based upon.

Hauser supports the theory of coagulation of Schmidt by his histological investigations. He could prove in cuts of the lungs of a child who died of diphtheria, and in several other cases, delicate nets of fibrin, with numerous central points. These latter ones were formed by closer nets of fibrin in whose centre a blood-corpuscle or tissue-corpuscle could be recognized. Hauser found the same picture also in some thrombotic bloodvessels. He therefore thinks that the ferment for coagulation becomes nascent from the decaying cells, and that consequently round these cells fibrin will be deposited.

The continuation of the physiological thrombosis of the placental bloodvessels, the thrombophlebitis purulenta, which originates from

infection of the physiological thrombus with pus germs, has to be explained as follows: The proteins of the cocci present in the infected thrombus of placental veins act at first chemotactically (Buchner, Leber, Pomorski, etc.) in gathering a large quantity of leucocytes; then they are plasmochitic and leucolytic. By this decomposition of the leucocytes the nucleo-histon which is contained in the cells is becoming nascent. Is the system not any more able to eliminate the nucleo-histon, the same will be analyzed, by the presence of calx in the plasma of the blood, in nuclein (which promotes coagulation) and histon (which delays it). The latter one, forming a compound with calx, becomes ineffective and leaves the whole field of operation to the nuclein, the only originator of coagulation.

Hence it is that where no leucolytic substance is present—this exists in a mere ligated vein—also no coagulation or thrombosis follows. The theory of Brücke, that the walls of a bloodvessel *in vivo* possess certain qualities adverse to coagulation, can therefore be laid aside; and, indeed, the writer could prove, what Zezeck ere now had published in his "Contribution to the Physiology of the Circulation of the Blood," that the blood remains fluid at a plain ligature of arteries or veins—under avoidance of infection—above and below the ligature.

The writer had the same experience with two control experiments which he performed with sterilized non-infected thrombi, in order to obviate the objection that thrombosis of a bloodvessel could be produced by insertion of any sterilized foreign body in the vena jugularis externa. A sterilized, non-infected wick thrombus was therefore inserted in the vena jugularis externa of a full-grown dog and rabbit. Ten days later the same wick thrombi were both, without reaction, grown into the veins of the animals. The thrombi were then cut out and put in bouillon for control, to see whether an accidental infection occurred; but the bouillon remained sterile. The blood above and below the artificial thrombus in both cases was found fluid

As mentioned, in each single case of our eighteen experiments the cocci of the pyæmic thrombi, the pus of the perivascular and embolic abscesses, were examined upon their identity with the germs used for the infection of the respective artificial thrombi, which caused abscesses, etc.; and in all eighteen cases the identical cocci could be proved not only by plate-cultures, but also by microscopical examination of the fresh pus.

Hence, by imitation of the natural cause of pyæmia the writer obtained the same phenomena which are characteristic for this infectious disease—thrombosis of the infected vein in the various stages of softening; phlebitis from the mere infiltration and thickening to the entire necrosis of the walls of the bloodvessel; seropurulent inflammation, with formation of phlegmons in the surrounding tissue; embolic

suppuration of the glandula submaxillaris and parotis; embolic abscesses in different parts of the caput and in the cerebrum, and, at last, general infection and death of the animal.

Jordan claims, in his publication upon "Acute Osteomyelitis," that, first, the quantity, and, second, the virulence of germs is decisive for the result of invading and tissue-destroying bacteria. He deducts the first requirement of a successful action of bacteria from experiments made by Watson Cheyne and Herman. Watson Cheyne claims 250,000,000 of staphylococci for bringing about a mere abscess in rabbits, and Herman concludes, from his numerous experiments with animals, that the coefficient for a subcutaneous suppuration is 520,000,000 in rabbits and 52,000,000 in dogs. Bumm found in his experiments as to the importance of pyogenous micro-organisms for progressive suppuration, that it is very difficult to equal the same results in animals with those in man unless the entire system of the animal were inundated with the respective bacteria.

Since the writer, with his infected thrombi, obtained the same pyæmic symptoms in dogs or rabbits as there are in man, he was very curious to learn how many germs were necessary for it, and especially whether there was a difference in the quantity of germs in comparison with the different quality of infection.

For this purpose he cut pieces 1 mm. long from different series of our infected wick-thrombi, ground them in 1 c.cm. of bouillon, mixed the same with agar-agar, poured it on sterile culture-plates, and kept them in the thermostat at 37° C. After forty-eight hours the number of germs grown on these plates varied from 80 to 150, which makes for the entire thrombus a total number of about 800 to 1000 cocci.

There is an enormous difference between the results of the experiments of Watson Cheyne, Herman, Bumm, and the writer's. But it cannot change anything in the fact that our infected wick-thrombi, although they only contain a number of cocci from 800 to 1000, caused, indeed, pyæmic symptoms in dogs and rabbits of the same intensity as in man. For that very reason we can conclude that it is not the quantity of pyogenous micro-organisms from which depends the intensity of an infection, but their virulence.

Before all, it will be of interest for us to find out the cause of the difference of this virulence in our eighteen cases. From columns 1, 2, and 4 of our synopsis we cannot perceive anything. Whether dogs or rabbits, whether streptococci or staphylococci, or both combined, were used for our experiments, or whether the cocci passed through agar-agar only once or several times before their employment—all this did not have any effect on the intensity of the pyæmic infection; also, Knorr found that streptococci did not lose any of their virulent properties even after their sixtieth passage of cultivation.

I. Animals. Experiments.	II. Species of cocci.	III. Place where cocci were found.	IV. Passage of cultivation.	V. Duration of preservation of completed thrombi before insertion.	VI. Identity of germs before and after insertion.	VII. Result of insertion of artificial infected wick-thrombi in vena jugularis externa.
1 Dog	Staphylococcus pyogenes aureus.	Fresh carbuncle pus.	1	9 hours.	Same.	*Death* after eight days. 4½ cm. long puriform softened thrombus; abscess in cerebrum; enlargement of spleen; general infection.
2 Dog	"	"	1	6 w'ks.	"	3 cm. long softened thrombus; perivascular, sero-purulent inflammation.
3 Dog	"	"	1	8 w'ks.	"	2 cm. long not softened thrombus; perivascular serous inflammation.
4 Rabbit	"	Pyæmic liver abscess.	3	14 hours.	"	3 cm. long softened thrombus; suppuration of gland, submax. sin.; abscess from ligat. ii. size of hazelnut; enlargement of spleen.
5 Rabbit	"	"	3	3 w'ks.	"	2 cm. long thrombus in beginning softening; perivascular sero-purulent inflammation.
6 Rabbit	"	Carbuncle pus.	6	6 hours.	"	*Death* after five days; 4 cm. long softened thrombus; suppuration of parotis; perivascular sero-purulent inflammation; enlargement of spleen.
7 Rabbit	"	"	6	9 w'ks.	"	2 cm. long thrombus; perivascular serous inflammation.
8 Dog	Streptococcus pyogenes	Erysipelas.	1	9 hours.	"	*Death* after 7 days; 4 cm. long softened thrombus; suppuration of parotis; meningitis purulenta; enlargement of spleen.
9 Dog	"	"	1	6 w'ks.	"	2½ cm. long softened thrombus; suppuration of gland; submax. sin.; perivascular sero-purulent inflammation.
10 Dog	Streptococcus pyogenes	Erysipelas.	1	8 w'ks.	"	2 cm. long thrombus; perivascular serous inflammation.
11 Rabbit	"	Parametritis exudativa.	4	14 hours.	"	5 cm. long softened thrombus; suppuration of parotis; perivascular sero-purulent inflammation.
12 Rabbit	"	"	4	3 w'ks.	"	3½ cm. long thrombus with beginning softening; perivascular sero-purulent inflammation.
13 Rabbit	"	Furuncle pus.	6	6 hours.	"	3½ cm. long softened thrombus; phlegmon from lig. ii. toward median line of neck.
14 Rabbit	"	"	6	9 w'ks.	"	2 cm. long thrombus; perivascular serous inflammation.
15 Dog	Strepto. & staphylococci.	Pus from abscess in arm.	1	9 hours.	"	4½ cm. long softened thrombus; suppuration of parotis; embolic abscess behind left ear; enlargement of spleen.
16 Dog	"	"	1	6 w'ks.	"	3 cm. long thrombus with beginning softening; perivascular serous inflammation.
17 Rabbit	"	Parametritis exudativa.	4	14 hours.	"	6 cm. long thrombus with beginning softening; suppuration of submaxillaries; phlegmon toward median line of neck.
18 Rabbit	"	"	4	5 w'ks.	"	4½ cm. long thrombus with beginning softening; perivascular sero-purulent inflammation.

Entirely different, however, stands the comparison of our cases in column 3—" place where the pus germs originated from "—and column 5—" duration of preservation of artificial thrombi from the time of their completion until their insertion in the vein." In column 3 we note a distinct difference in the virulence of the same cocci among themselves, and not, as one supposed, of the different species of cocci in comparison with each other. Staphylococci from carbuncle pus used immediately after their obtaining caused fatal pyæmic symptoms; whereas the same species of cocci obtained from a pyæmic abscess created again pyæmic symptoms, but with less intensity and without fatal termination. The same proportion existed between streptococci obtained from erysipelas and ordinary abscesses.

In column 5 at last we perceive a very distinct difference in the violence of the different pyæmic symptoms. The greatest effect of the inserted thrombi was noted, independent from the place where the cocci used for infection were found, if the same were inserted in the vein of the animals directly or only a few hours after their completion. (See Experiments 1, 4, 6, 8, 11, 13, 15, and 17.) The longer, however, the completed thrombus was preserved in its dry condition the less was the virulence of infection. (See Experiments 2, 3, 5, 7, 9, 10, 12, 14, 16, and 18.) The virulence degree of staphylococci and streptococci is therefore in inverse proportion to their preservation in a dry state.

Although we know from Axel Holst that desiccated bouillon cultures of streptococci lose their virulence, and from Hausman and Fröhlich that staphylococci undergo the same loss of virulence by a dry, protracted preservation, an accurate experimental confirmation of this long known theory was still lacking. The writer, therefore, is confident he has proved by his experiments the fact that an abode of cocci in a dry state—*i. e.*, a loss of their water molecules—is extremely detrimental to their virulence, and in time abolishes it entirely. That this loss is due to a chemical destruction or ineffectual transposition of the albumin of the bacteria, and not to a mere decay of the same, is proved from the fact that the infected wick-thrombi, the cocci of which became ineffective by too long a preservation, healed in the veins of the two control animals without any reaction. Even the chemotactic working proteins were absent—a substance which, according to Buchner, could be obtained only by boiling the bacteria for hours in 0.05 per cent. liquor potassi.

The questions which the writer asked in the preface, Whether pyæmia is due to a special species of pus germs, and what reason causes a different vehemence of a pyæmic infection, may be answered at the conclusion of this paper, as follows:

It did not make any difference whether staphylococci or streptococci alone, or both together, were used for infection of our artificial cotton-

wick thrombi; the insertion of the same in the vena jugularis externa of eighteen animals caused uniformly pyæmia, with its characteristic symptoms—phlebitis, suppuration in the surrounding tissue, embolic abscesses in submaxillaris, parotis, cerebrum, and general blood-poisoning and death of animals.

The intensity of the pyæmic infection depended:

First, from the place where the employed cocci were found (staphylococci from carbuncle pus and streptococci from erysipelas proved the most poisonous ones, no matter how many passages of their cultivation they experienced).

Second, from the duration of the preservation of the completed artificial thrombi before their insertion in the vena jugularis externa (the longer staphylococci and streptococci were kept in a dry state the greater was the loss of virulence, no matter how virulent the cocci proved at their first examination).

REPORT OF A CASE OF HEMIANÆSTHESIA OF OVER EIGHT YEARS' DURATION, RESULTING FROM DESTRUCTION OF THE CARREFOUR SENSITIF AND LENTICULAR NUCLEUS WITHOUT DIRECT IMPLICATION OF THE OPTIC THALAMUS.[1]

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The optic thalamus was first regarded as a sensory centre many years ago. Carpenter's theory, as given by W. H. Broadbent,[2] in 1866, was that the thalamus is the organ of conscious sensibility, to which all impressions made on peripheral sensory nerve fibres must be transmitted in order to be recognized as sensations; and that the corpus striatum is the organ or instrument of voluntary motion—the downward starting-point of volitional motor impulses, or, it might be said, of all cerebral motor impulses. This is very different from the views now held regarding the thalamus. The theory that the thalamus is a sen-

[1] Read at the meeting of the American Neurological Association, June, 1901.

[2] The British and Foreign Medico-Chirurgical Review, January to April, 1866, vol. xxxvii., p. 468.

sory centre, as held in 1866, was not founded on careful anatomical investigations, and erroneous views were entertained at that time regarding the course of the sensory fibres; indeed, the course of these fibres is not fully known, even at the present time.

Broadbent also looked upon the thalamus as a sensory centre, as did Hughlings Jackson. The latter, writing in 1866, said: "Hemiplegic paralysis especially is common, but hemiplegic anæsthesia is very rare. Both, however, occur together from disease of the same centre of the brain, viz., the optic thalamus," and he reported a case as proof of this statement. In his case the degree of loss of sensation was so unusually great, according to his experience of chronic cases of hemiplegia, that he diagnosticated disease limited to the optic thalamus. He had carefully ascertained during the patient's life that sensation was impaired in the region of all the sensory branches of the fifth nerve, which supply the skin, and also in one-half of the trunk as well as in the arm and leg; but sensation was not lost, nor was it so much impaired that pinching was not painful.

His description of the necropsical findings is as follows: "The disease was not strictly limited to the thalamus. At the autopsy I cut through it from within outward, beginning at about the line of the posterior commissure. This incision went through the remains of a clot. The diseased part did not extend to within a quarter of an inch of the commissure, nor to within about that distance of the geniculate bodies.

"In front of the incision the quantity of the centre disorganized would be equal to a small hazelnut; outward *the disease extended through the small tongue of corpus striatum, which curves round the outside of the thalamus, and thence up to the gray matter of the convolutions of the Sylvian fissure*" [italics ours]. As this was not a chronic case, there is no way of deciding how much of the loss of sensation may have been due to pressure on sensory fibres outside of the thalamus and how much to injury of the thalamus; and Jackson's[1] description seems to indicate that the *carrefour sensitif* may have been implicated.

The *carrefour sensitif*, as defined by Verger,[2] comprises the last third of the posterior limb of the internal capsule in the most inferior portion of the opto-striate region.

Those who accepted the views of Meynert believed in the existence of a sensory tract in the external portion of the foot of the cerebral peduncle, and the supposed continuation of this tract in the posterior part of the internal capsule gave the foundation for the theory of the

[1] Clinical Lectures and Reports by the Medical and Surgical Staff of the London Hospital, 1866, vol. iii. p. 373.

[2] Archives Générales de Médecine, 1900, vol. ii.

carrefour sensitif. Charcot,[1] in 1876, said that only a lesion of the internal capsule caused symptoms permitting an exact cerebral localization. A lesion at the posterior third of this part was supposed to give rise to anæsthesia implicating the general sensation as well as the special senses. This lesion, if it extended a little further forward, caused hemiplegia. Below the position of the *carrefour sensitif*—*i. e.*, in the cerebral peduncle—a lesion was not supposed to cause disturbance of the special senses as well as of the general sensation. The same may be said of a lesion above the *carrefour sensitif.*

The form of hemianæsthesia with disturbance of the special senses is now quite generally regarded as hysterical; but though Meynert's views relative to a sensory tract in the external bundle of the foot of the cerebral peduncle can hardly be accepted at the present day, the *carrefour sensitif* is still held by many to be the location of the sensory fibres. Some believe that the median lemniscus, in whole or in part, in passing to the cerebral cortex has a situation in the internal capsule behind the motor fibres; others, while acknowledging that the median lemniscus terminates in the optic thalamus, believe that the *carrefour sensitif* contains thalamo-cortical sensory fibres.

The views of Dejerine are directly in opposition with these ideas, and he has expressed them many times. It is not possible, according to him, to admit the existence in the posterior segment of the internal capsule of a region for sensory fibres only. These sensory fibres are intimately mingled in the internal capsule with the fibres of projection. Hemianæsthesia of general sensation, of central origin, can exist only when a lesion in the optic thalamus destroys the terminal fibres of the median lemniscus and the cortico-thalamic fibres; or when the connections of the thalamus with the sensori-motor cortex are destroyed, even though the thalamus may be intact; and in the latter case the lesion is always very extensive. Hemianæsthesia is much more likely to be persistent when the thalamus is injured.[2]

Probably the most recent statement of Dejerine on this subject is made in the second volume of his anatomy of the nervous system, which, when translated, reads: "When one examines the observations of capsular hemianæsthesia with autopsy reported until the present time, one recognizes that in the immense majority of cases the optic thalamus was implicated together with the posterior segment of the internal capsule; and in the very rare cases in which the lesion of the thalamus is not indicated one cannot assert that this ganglion was intact, because in all these observations the localization was made with the naked eye and on fresh material. On the other hand, there exist observations of lesions of the posterior segment of the internal capsule with integrity of

[1] Comptes rendus de la Soc. de Biologie, 1876, p. 254.

[2] Dejerine and Long. Comptes rendus de la Soc. de Biologie, 1898, p. 1174.

the thalamus, and in these cases the patients were simple hemiplegics without anæsthesia. We ourselves have observed two very positive cases of this character studied by the method of serial microscopical sections."[1]

Long,[2] holding very much the same views as Dejerine, believes that the sensory fibres coming from the spinal cord pass to the inferior and external portion of the thalamus, and that sensory thalamo-cortical fibres pass by the internal capsule, but not in an area posterior to that occupied by the motor fibres.

The external bundle of the peduncle, according to Dejerine, is formed by a band of fibres that comes from the middle portion of the second and third temporal convolutions, and enters the retrolenticular portion of the internal capsule in the hypothalamic region. It is not a sensory tract, because it degenerates downward and terminates in the pons.

The views of Verger[3] on the subject of the position of the sensory fibres are of interest. He says that the conclusions of Dejerine and Long concerning the localization of lesions causative of hemianæsthesia may be considered exact, as they are in harmony with facts revealed by a study of normal anatomy and anatomico-clinical investigation; and it is easy to demonstrate that they are applicable to all cases with autopsy published under the name of capsular hemianæsthesia. The capsular localization, in the narrow sense as was formerly understood, he regards as manifestly incorrect; and he cites a case published by Long (Case X.) as proof of this statement, since in this case a circumscribed lesion of the internal capsule, he says, caused some sensory disturbances, although the *carrefour sensitif* was intact. The sensory disturbances, however, were not pronounced.

In order that a case may be of value in reference to the question whether a lesion confined to the *carrefour sensitif* may cause hemianæsthesia; or whether the lesion must implicate the whole of the posterior limb of the internal capsule, because of the mingling of sensory with motor fibres, according to Dejerine; or whether the lesion must implicate the thalamus in order that hemianæsthesia may exist, it is necessary that the hemianæsthesia should have existed a long time —more than a few weeks at least—and therefore was not merely a symptom at distance; that the lesion should have been of such a character as to cause little pressure on surrounding tissue, therefore not a tumor; and that only one of the three areas—the *carrefour sensitif*, or the posterior limb of the internal capsule, or the thalamus—was much injured. Such a case, of course, is exceedingly rare. In Verger's Cases XXX. and XXXI. the lesions were recent. In his Case XXXII.

[1] A. and J. Dejerine. Anatomie des Centres Nerveux, Tome deuxième, Fascicule 1, p. 257.
[2] Les voies centrales de la sensibilité générale.
[3] Archives Générales de Médecine, 1900, vol. ii.

the hemianæsthesia persisted only about a month, and was due to a hemorrhagic focus in the postero-external part of the thalamus implicating slightly the middle portion of the posterior segment of the internal capsule.

Long[1] reports two cases of central lesion of the brain without hemianæsthesia (Cases X. and XII.). In one case the posterior segment of the internal capsule was destroyed and the optic thalamus was intact; but in the detailed report of this case he says the lesion did not extend to the retrolenticular segment of the internal capsule, and this is also clearly shown by his drawing. This case would seem to show that destruction of the internal capsule does not cause intense hemianæsthesia. In the other case the lesion implicated only a part of the posterior limb of the internal capsule and only the anterior and internal nuclei of the thalamus, leaving the external nucleus intact as well as the region of the *carrefour sensitif*. In regard to his Case X., in which the posterior limb of the internal capsule was so seriously implicated, it was difficult, Long says, to explain the absence of pronounced sensory disturbances, because the thalamo-cortical fibres were probably destroyed by the lesion of the internal capsule, and yet sensation was little affected.

The hemianæsthesia from central lesion of the brain, as shown by all cases with necropsy, Long says is never absolute, even in the first weeks following the onset of the hemiplegia. The organic hemianæsthesia described by Verger[2] is principally an anæsthesia of the extremities. If the trunk is implicated it is not as much so as the limbs, and the upper limb is more anæsthetic than the lower. In the limbs the anæsthesia is more marked in the distal parts than at the root of the limbs, and it diminishes gradually as parts of the limbs nearer the trunk are examined. The borders of the anæsthesia may vary slightly from time to time, but not so much as Long believes. This anæsthesia is really incomplete; it is merely hypæsthesia, and contact is felt, but not so keenly in the affected limbs as in those of the other side of the body. The qualitative change in perception of tactile sensation is greater than the quantitative, and the patient cannot distinguish the rubbing of a finger from that of a piece of wood or cloth, and he is unable also to localize the area touched. Hypalgesia is less common than hypæsthesia, but the power to localize the pain produced is often affected. Temperature sense is less often implicated. Dejerine[3] has expressed views similar to these in many particulars.

The following case which seems of much importance in regard to the lesion causing central hemianæsthesia was presented *intra vitam* by one of us (Dr. Dercum) before the Philadelphia Neurological Society on

[1] Loc. cit.
[2] Loc. cit.
[3] Semaine Médicale, July 6, 1899, No. 32, p. 249.

January 23, 1899,[1] and seems to be the first case to demonstrate clearly that a lesion of the *carrefour sensitif* and lenticular nucleus without implication of the optic thalamus may cause hemianæsthesia. The history was as follows:

CASE I.—J. B., male, aged forty-nine years, mulatto, laborer, was admitted to the Philadelphia Hospital, November, 1892.

The family history is unimportant and unsatisfactory. Father died at forty-eight, cause unknown; mother died of "dropsy and asthma" at middle age. One brother and one sister are dead, cause unknown.

Personal History. He had various diseases of childhood: measles, chicken-pox, mumps and whooping-cough. He has had no illness of moment, except an occasional cold, until he had an attack of paralysis about 1892. This attack he describes as follows: He "suddenly fell fast asleep while at work." A fellow-workman shook him and he awoke to find his right arm, his right leg, and the right side of his face paralyzed. He could not move the right arm and right leg, nor did he have any feeling in them; and he could not talk. He recovered his speech in about two months, and motion in the arm and leg in about three months. Sensation, however, has never returned in the right side. He denies a venereal history, but acknowledges that he has used both alcohol and tobacco.

Through an inadvertence at the time the case was presented, the word "left" was used instead of "right" in speaking of the hemiplegia and the hemianæsthesia. It was the *right* side which was involved. There was present in 1899 a spastic hemiplegia of the right side, moderate in severity, together with a moderate degree of contracture of the right arm and spastic rigidity and exaggeration of the knee-jerk of the right leg. There was a very slight involvement of the right side of the face. The hemianæsthesia was well defined by the middle line of the body and appeared to be everywhere complete. Right-sided homonymous hemianopsia was associated with this hemianæsthesia. There was no impairment of hearing upon the right side, nor was there any involvement of taste or smell. The sensory symptoms were limited to those concerned in the various forms of cutaneous sensibility and to the hemianopsia.

The hemianæsthesia was studied repeatedly and while intense it presented the following peculiarities: It was noted that the results varied slightly at various examinations. It was found for instance that upon several occasions the patient would respond when the trunk upon the hemianæsthetic side was tested or when the proximal parts of the limbs were tested, that is, the upper arm and shoulder or thigh and hip. It was noticed also that occasionally he would respond when the right side of the face below the eye and above the mouth was touched. At most of the examinations, however, no responses were obtained in these situations. At different times also it was noted that the line defining the hemianæsthesia from the side with normal sensation varied somewhat, at times retreating a little from, and at other times advancing toward, the sound side. In the distal portions of the limbs, however, such as the forearms and hands and legs and feet, no variations in the tests were ever observed. The hemianæsthesia appeared to involve equally all the

[1] Journal of Nervous and Mental Disease, vol. xxvi., No. 4.

forms of cutaneous sensation. Occasionally upon the trunk the patient made attempts to differentiate between hot and cold, but the answers were more frequently incorrect than correct.

The reflexes were as follows: The knee-jerk upon the right side was exaggerated; upon the left side, normal. There was present a pronounced front tap reaction upon the right side; none upon the left. There was no ankle clonus upon either side. The tendon reactions in the right arm were exaggerated while those in the left arm were absent.

The diagnosis was made of a lesion in the left hemisphere involving especially the posterior third of the posterior limb of the internal capsule, together with the fibres of the optic radiation; some involvement of the anterior two-thirds of the posterior limb was also considered probable. It was further remarked that cases of hemiplegia, even of organic origin, with persistent hemianæsthesia, are comparatively rare; that hemianæsthesia and hemianopsia, while not infrequently observed during an apoplectic seizure or immediately subsequent to a seizure, commonly disappear at a relatively early period; that the sensory phenomena as a rule prove to be distance symptoms, and that actual lesions of the posterior portion of the internal capsule and optic radiation as a result of apoplexy are of rare occurrence.

On May 24, 1900, the patient developed a nephritis which persisted until his death. On January 6, 1901, he suffered from a fresh apoplectic seizure. The attack came on during the night, and the left arm and the left leg were involved. The paralysis was not, however, complete, and he was able to move the limbs, though slightly. The physical examination revealed a mitral systolic murmur and some roughness of the second sound. The lungs were resonant throughout, though there was some dulness posteriorly on the right side. He was conscious, but developed Cheyne-Stokes' respiration. On the morning of January 9th, he was still conscious but continued to have Cheyne-Stokes' respiration. At noon he became suddenly unconscious. Upon raising the left arm and left leg, they fell as though completely paralyzed. The right side, the seat of the old hemiplegia, was very rigid, however, more so than before. Marked œdema of the lungs now developed and the patient died twelve hours later.

A clinical report of this case was published by Drs. C. K. Mills and G. E. de Schweinitz[1] in 1896. Dr. de Schweinitz found right lateral quadrant anopsia (1896), whereas in Dr. Dercum's clinical report (1899) the man is said to have had right-sided homonymous hemianopsia. The report of Drs. Mills and de Schweinitz is as follows:

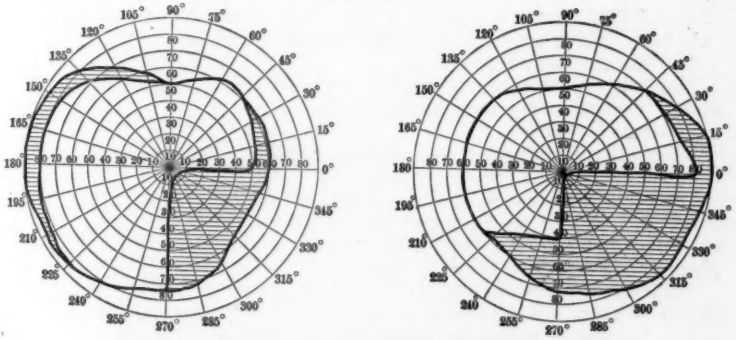
"CASE II.—*Right lateral quadrant anopsia, absence of Wernicke's symptom; dyslexia; right hemiparesis; partial right hemianæsthesia; partial word-deafness and word-blindness.*—J. B., aged forty-two years, a laborer, May 3, 1892, had an apoplectic attack with loss of speech, and was taken to the Hospital of the University of Pennsylvania, where he remained until November, 1892, when he came to the Philadelphia Hospital. He improved slowly. During his stay in the University Hospital, he noticed when he grasped an object with his right hand that he could not release it as promptly as when he seized it with his left.

[1] The Philadelphia Hospital Reports, 1896, vol. iii.

"Examination showed that he was paretic in the right arm, and his field of vision toward the right was decreased. He says that at times he could not understand what was said to him, especially if the person speaking stood to his right. Examination showed paresis of the right forearm, partial right hemianæsthesia, tongue slightly tremulous on protrusion, pointed and deviating a little to the right. He had gradually recovered his speech.

"From the first he says he knew what he wanted to say, but could not put it into such words as would be understood by his hearers. He could recognize objects, but could not pronounce their names. He could not read writing or print because everything ran together; he recognized the letters, but could not pronounce them. He understood sentences, but could not repeat them. He had almost completely recovered from his aphasia, although his voice was a little thick and difficult to understand. One of the most marked phenomena was that which has been described as dyslexia.

FIG. 1.



Visual fields taken in 1896, showing right lateral quadrant anopsia.

"The examination of his eyes gave the following results:

"*R. E.*—Oval disk, shallow, dish-like excavation, almost complete. Vessels about normal in size; no fundus lesions.

"*L. E.*—Small, nearly round disk, and small physiological cup. Vessels almost normal in size.

"Pupils equal and round; mobility of iris normal; no hemiopic pupillary inaction.

"*Fields.*—Right lateral quadrant anopsia."

It is perhaps wiser not to make any extended comments on the condition of aphasia, as the statements relative to this were made by the patient. It is important to note that although an extensive subcortical lesion of the left temporal lobe existed, the patient had regained his speech.

Post-mortem Record.—Body of a well-developed man, showing considerable post-mortem rigidity. Some œdema of hands and ankles.

Chest well formed, abdomen slightly distended. Right arm shows some atrophy, hand partially flexed on forearm.

Upon opening abdomen a thin layer of subcutaneous fat is noted. Distention of stomach and intestines is seen. The appendix is about 11 cm. (4½ inches) post-cæcal, and points toward the liver. The liver extends about 1 cm. (½ inch) below costal arch.

Left pleural cavity is free. Right pleura shows adhesions, posterior at lower lobe and apex. Adhesions were old.

Both lungs show extensive œdema and congestion.

Spleen measures 10½ x 8 x 3 cm. (4⅛ x 3⅛ x 1⅛ inches). Congested and firm.

Left kidney measures 11½ x 5½ x 3 cm. (4½ x 2⅛ x 1¼ inches). Capsule strips with some difficulty, leaving a rough, uneven surface. The kidney substance is normal. Some congestion; small infarcts.

Right kidney, 12 x 5½ x 3 cm. (4¾ x 2⅛ x 1⅛ inches), shows advanced interstitial nephritis. Small cysts under capsule.

The heart shows extensive hypertrophy, especially of left ventricle. Right ventricle is dilated and only slight hypertrophy. Heart weighs 630 grammes. The coronary arteries show extensive atheroma; this involves the anterior arteries especially. The heart muscle is somewhat fibrous. The anterior and posterior mitral leaflets present a few sclerotic patches. Valves are competent. Other valves normal.

The left adrenal normal.

The liver appears small, and the surface is smooth and edges are short. On section the liver is congested.

Pancreas is normal.

Intestines are congested, as is also the stomach. No other pathological changes of these organs are found.

The brain membranes show considerable œdema. A recent hemorrhage is found in the right cerebral hemisphere in the region of the lenticular nucleus. An old cyst is present in the left cerebral hemisphere and is described below in detail.

Pathological Diagnosis.—Œdema and congestion of lungs. Hypertrophy of heart. Atheroma of coronary arteries. Interstitial myocarditis. Interstitial nephritis. Cerebral hemorrhage and cerebral cyst.

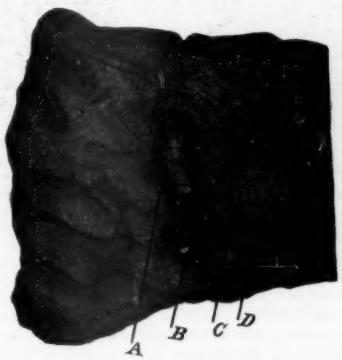
When the lateral ventricles of the brain were opened by a horizontal cut just above the upper surface of the optic thalami, the caudate nucleus on the right side was found destroyed by a recent hemorrhage, the right optic thalamus was intact and presented a strong contrast with the optic thalamus of the left side, which was shrivelled in its posterior portion. No cyst was apparent on the left side at this level. The left optic thalamus on its superior surface measured antero-posteriorly 3.3 cm. ($1\frac{5}{16}$ inches); the right 4.5 cm. ($1\frac{3}{4}$ inches). The left optic thalamus in transverse diameter in its widest portion on its upper surface measured 1.8 cm. (¾ inch); the right in a corresponding portion measured 2.5 cm. (1 inch). To the naked eye the left optic thalamus appeared to be about one-half the size of the right thalamus on its upper surface. The anterior part of the left optic thalamus was rounded and convex, but the posterior portion was sunken and concave. In the photograph (Fig. 2) the piece of tissue behind the left optic thalamus is a part of the hippocampal gyrus. A horizontal section made through the left optic thalamus at the part where a crack is seen in the photograph (Fig. 2), cutting off only the anterior

superior portion of the left thalamus, revealed a condition represented in Fig. 3. A cavity, probably resulting from an old hemorrhage, 2.8 cm. (1¼ inches) in depth from above downward, and 2.5 cm. (1 inch) in its longest diameter at the level, represented in Fig. 3, was found in the extreme capsule, claustrum and external capsule of the left side. The

FIG. 2.

Photograph showing the optic thalami. *A*. Portion of hippocampal convolution; *B*. Atrophied portion of left optic thalamus; *C*. Line showing the level at which the horizontal section represented in Fig. 3 was made.

FIG. 3.



Photograph showing the upper portion of the cyst in its relation to the optic thalamus. *A*. Cyst situated chiefly in the lenticular nucleus; *B*. Posterior limb of the internal capsule; *C*. Atrophied portion of the left optic thalamus, shown also in Fig. 2 at *B*; *D*. Line showing the level at which the horizontal section represented in Fig. 3 was made; shown also in Fig. 2 at *C*.

left lenticular nucleus appeared to be almost destroyed and the extreme posterior part of the posterior limb of the internal capsule and the optic radiations were involved. The anterior half of the posterior limb of the internal capsule was not implicated in the cyst. The anterior limb of the internal capsule was entirely normal. The optic thalamus was not

implicated at all in the cyst, and the external medullary lamina of the thalamus was distinct and normal in appearance. The anterior tubercle of the left thalamus was relatively larger than the external nucleus, and seemed to be of about normal size. A transverse cut made 1.5 cm. (⅝ inch) below the level represented in Fig. 3 and passing through the hypothalamic region showed the posterior limb of the internal capsule apparently fully normal. The lenticular nucleus, except in its extreme ventral portion, was destroyed.

The portion of the thalamus that showed atrophic change was the pulvinar, and this alteration was the result of the destruction of the optic radiations. The left optic tract was much smaller than the right,

FIG. 4.

Photograph of a microscopical section. *A.* Anterior part of the lenticular nucleus; *B.* Anterior limb of the internal capsule; *C.* Head of the caudate nucleus; *D.* Posterior limb of the internal capsule; *E. Carrefour sensitif* degenerated; *F.* Cyst.

and the external geniculate body was not distinct. The left mammillary body was one-third or one-half smaller than the right.

The basal ganglia of the left hemisphere with the parts adjoining were cut in microscopical serial sections; the result of a study of these sections is as follows:

The cyst implicated the posterior portion of the lenticular nucleus, the outer part of the posterior portion of the posterior limb of the inner capsule, the area of the *carrefour sensitif*, and the optic radiations. The greater portion of the posterior limb of the internal capsule was intact. The optic thalamus was not implicated at any part in the cyst. The

cyst was limited on its outer side in its upper portion by the cortex of the insula. The posterior part of the optic thalamus in its superior portion contained few nerve fibres, because of the secondary degeneration from the lesion of the optic radiations, but at a little lower level more fibres were found entering the posterior part of the thalamus. The cyst maintained the same relative position in all the sections as far as the lower part of the temporal lobe. In sections from lower levels the posterior part of the posterior limb of the internal capsule was even less implicated than in those from higher levels. The fasciculus of

FIG. 5.

Photograph of a microscopical section at a lower level than that shown in Fig. 4. *A.* Anterior part of the lenticular nucleus; *B.* Anterior limb of the internal capsule; *C.* Head of the caudate nucleus; *D.* Posterior limb of the internal capsule; *E. Carrefour sensitif* degenerated; *F.* Cyst.

Türck, which, according to Dejerine, comes from the second and third temporal convolutions, was not entirely degenerated, and some fibres of this fasciculus were found passing to the posterior part of the posterior limb of the internal capsule. The left external geniculate body was much smaller than the right, because of the implication of the left optic radiations. The foot of the left cerebral peduncle was much narrower than that of the right, and the external portion of the former was not so deeply stained as the rest of the foot. This external bundle was not completely degenerated, because the fasciculus of Türck was

only partially degenerated. The lemniscus on the left side was one-fourth to one-fifth narrower than that on the right side in the interolivary region. Sections of the medulla oblongata were obtained as low as the upper part of the nuclei of Burdach. The right-crossed pyramidal tract in the spinal cord was only slightly degenerated.

The hemianæsthesia in this case was such as has been observed after organic cerebral lesions, and persisted probably over eight years. While variations in sensations occurred at times on the trunk and face, they were never observed in the distal portions of the limbs. The hemianæsthesia corresponded to that produced by cerebral lesion and could hardly have been of hysterical nature. It was much more intense than the hemiparesis, and the reason for this is found in the slight degeneration of the motor part of the posterior limb of the internal capsule. The hemianæsthesia was so remarkable that the case was presented by Dr. Dercum before the Philadelphia Neurological Society in 1899 simply because of this phenomenon.

The microscopical serial sections of the left cerebral hemisphere show that at no place did the cyst implicate the optic thalamus, but the lenticular nucleus, except in its most anterior portion, and the area at the posterior part of the posterior limb of the internal capsule, known as the *carrefour sensitif*, were destroyed. The optic radiations were also implicated in the cyst, and thereby the partial blindness is explained.

This case seems to show that organic hemianæsthesia may be caused by a lesion in the *carrefour sensitif* and lenticular nucleus, without implication of the optic thalamus, except such as occurs from secondary degeneration. We emphasize the statement that in this case the inferior and external portion of the thalamus was intact. It seems to be the first case of the kind carefully studied in the literature. Whether or not the implication of the lenticular nucleus is necessary for the existence of organic hemianæsthesia we cannot determine by a study of our specimens. The integrity of almost the whole of the posterior limb of the internal capsule seems to indicate that the sensory fibres are located chiefly, if not entirely, in the area of the *carrefour sensitif*, or it may be that some sensory fibres pass through the lenticular nucleus. This view is in accord with the teaching of Edinger,[1] inasmuch as he states that a portion of the sensory tract passes through the posterior third of the internal capsule and a portion through the lenticular nucleus. The lemniscus in its interolivary portion on the left side was one-fourth to one-fifth narrower than that on the right side, and from this we conclude that the lemniscus on the left side had undergone retrograde atrophy. Some of its fibres, therefore, were probably cut in the lesion of the *carrefour sensitif* and lenticular nucleus.

[1] Vorlesungen über den Bau der nervösen Centralorgane des Menschen und der Thiere. Sechste Auflage, pp. 261, 422.

THE IMPORTANCE OF PROPER DIETARY REGIMEN IN THE TREATMENT OF CHRONIC HEART AFFECTIONS, AND AN ATTEMPT TO FORMULATE SOME RULES THEREFOR.*

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There can be no question that the matter of diet is of much importance in the treatment of heart affections, as all the treatises, whether general or special, refer thereto in their respective sections on treatment; but that its importance is not adequately appreciated is also evident from this: that all these works content themselves with a few general phrases, a brief paragraph or two, and the subject is dismissed. So far as my reading goes, no systematic attempt has yet been made to formulate any rule or rules whereby the physician having the responsibility of such cases might guide himself.

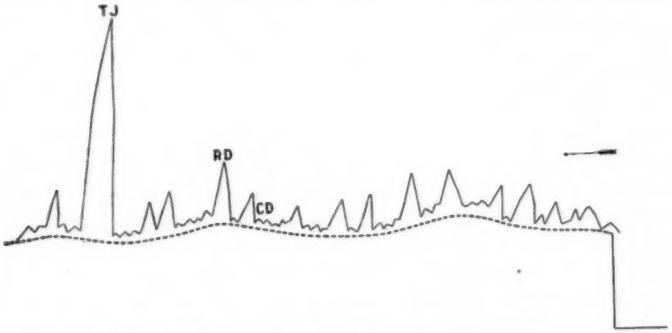
And still, if there is any one special question in the treatment of disease—diseases of the heart in particular—that deserves detailed consideration, it is this of *diet*, for in this the personal equation of the attending practitioner, his general knowledge of dietetics, his personal experience with many dishes, with the various methods of preparing food, and, lastly, a factor not to be overlooked, the state of his own digestive organs, enters more largely than in any other in the whole domain of morbus curandi. I remember, while working in a clinic studying the diseases of the digestive tract, asking several gentlemen who were present at the time, whether any one of them had a conception of what it was not to be able to digest well, not to be able to digest this or that article of food, not to be able to digest food cooked after a certain fashion, and all of them in one voice answered "No!" They could all digest well and everything that came along and prepared after any fashion. It is, then, not to be wondered at that very curious dietary regulations are not infrequently prescribed or that even men eminent in the profession pay but little or no attention thereto.

That the stomach is of great influence upon the heart has long since been recognized by eminent clinicians both of past and modern times. Abercrombie[1] already taught that disturbances of cardiac rhythm, even to the producing of murmur, may be caused by the stomach. Stokes[2] warns his readers not to be too hasty in making diagnoses of organic cardiac affections where symptoms of hepatic derangement or of gastric

* Read before the Medical Society of Greater New York, March 11, 1901.

disturbance are present; for, he says, "it happens not rarely that with the relief of these latter conditions the heart phenomena, even the evidences of dilatation, may disappear." Huchard[3] and See[4] tell us that angina pectoris may depend upon a deranged stomach, and Potain[5] that even dilatation of the heart may have such origin.

In truth, however, it is not the stomach at all that is at fault. The stomach as an organ *per se* does not influence the heart one way or the other; it is *what is put into it*, and not infrequently also the condition in which it is at the time to receive this ingested material that is the real factor or factors that must be reckoned with. It was to bring this out more prominently, to show the close relationship between the mode of living and the heart trouble, that in the histories recorded in my paper on "Cardiac Disturbances from Gastric Irritation,"[6] illustrative of the various disturbances there treated of, I gave in detail the sins in eating and drinking perpetrated by these patients upon their stomachs.



Pressure curve from the fundus of the human stomach (water manometer). Read from right to left. Wavy course of the curve (punctated line) as expression of gastric contraction; R D, respiratory pressure variations; C D, cardiac pressure variations; T J, deepest inspiration. (Moritz.)

If, now, the wrong done the stomach by forcing upon it an improper diet, improper in quality or quantity, can give rise to cardiac disturbances even of so grave a character as angina pectoris or dilatation, it is not far-fetched to assume—nay, it stands to reason—that where the heart's action has been disturbed by other causes, such improper diet will keep up the disturbance; and where the heart has been organically damaged it will not alone prevent the vis medicatrix naturæ from warding off, as far as possible, the consequences of such damage, but will surely hasten them on.

The heart and the stomach are in close relationship with each other. The great nerve which innervates the stomach is the same one that exerts the controlling influence over the heart, *i. e.*, the *vagus*.

Again, the heart lies in close proximity to the stomach; the former just above and the latter just below the diaphragm, the point of the heart over the great cul-de-sac of the stomach.

In his study of the passive movements of the stomach, Moritz[7] has found and has demonstrated graphically that certain movements are impressed upon the stomach by the heart—*i. e.*, that with each systole as the heart contracts in width and stretches out in length the point presses down upon the stomach to a degree appreciable to a recording instrument, and thus a wave of movement is created in this latter organ.

With these several points fixed in the mind we can readily understand in what ways the stomach exercises its influence upon the heart. These are:

1. By way of the vagus.
2. By contiguity.

1. By Way of the Vagus: It has already been determined long ago by Bidder and Schmidt,[8] and later by Schiff,[9] that the ingested aliment is the stimulus that acts upon the intramuscular filaments of the ninth pair, and thus excites the normal gastric movements. When, now, the aliment is of an improper character—improper in quality, quantity, or mode of preparation—and this also has been well determined by long and careful clinical observation, then these nerve filaments are unduly irritated, and this exaggerated stimulus—this abnormal irritation—may spread itself locally or be conveyed upward to the nerve trunks, and along them, and be reflected upon the heart either directly (by way of the vagus and cerebrum or vagus, cerebrum, and sympathetic) or indirectly, in the way that the irritation is primarily reflected upon the pulmonary vessels,[10] and the heart becomes affected secondarily only, in consequence of this. However, all this has been set forth and discussed more fully in the paper "Cardiac Disturbances from Gastric Irritation," already referred to, and requires no further comment here.

The manifestations of such undue irritation may be, in so far as the heart is concerned, (1) disturbances of rhythm, (2) painful sensations about the præcordium, and (3) dilatation of the right half of the heart.

In the article already referred to cases illustrative of various of these forms of cardiac disturbances were given in detail, and though bearing pointedly upon the question under consideration I have not held them as coming strictly within the limits of this paper or as sufficiently demonstrative for our purpose, for the reason that the stomach was there the etiological factor, and have not recalled them here. In the subjoined case the cause lay outside of the stomach, and subsequently an erroneous diet—erroneous in quality and quantity—tended not alone to keep up the trouble, but to aggravate it.

Case I.—July 7, 1897. Mrs. T., aged fifty-seven years; married; children; woman of large frame; five feet, four inches; weight before her present illness 175 pounds, now 99 pounds. Up to seven years ago she enjoyed excellent health, and, as her economic situation was good, she had neither undue work to fatigue her nor particular cares to worry her. About this period she suffered a severe shock; fire broke out in her home one night, made rapid headway, and ere she knew it her escape was cut off. She made her way to a second story front window, and there she stood with the flames hissing and rolling about her for what seemed to her an eternity. She was finally rescued by the firemen by the aid of ladders.* From this dates the beginning of her ailment—a tendency to nervous paroxysms, with occasional palpitations having suddenly developed. Her nutrition became impaired; she grew abnormally stout, and with this her heart began to functionate badly. She was put on a reduction treatment, and, though she grew thinner, there was no improvement in either the state of her heart or her nerves. Two years ago she had an attack of influenza, and since then she has grown rapidly worse. Her heart trouble became markedly aggravated, the paroxysms becoming more frequent, more severe, and of longer duration. For the last year she has not ventured to come down from her apartment, and had not been out of the house until about a month ago, when she was removed to her summer cottage by the seaside. Here also she remains in her room and will not venture out. Her meals are served in her apartment, and she has an attendant with her day and night. She passes her time between the bed and the lounge, with brief intervals upon the rocking-chair.

She had been long under the care of a most eminent medical gentleman, and latterly a near relative, also a practitioner of prominence, was in constant attendance. At various times in the course of her sickness, particularly in the latter period thereof, she was seen in consultation by other eminent physicians of this city. So far as I could judge, the case was evidently looked upon as a hopeless one, and a "laisser aller" course pursued in general, with merely attempts at palliation when the paroxysms came on.

Status Præsens. Emaciation very marked as already related. The panniculus adiposus has entirely disappeared, and the organs beneath the abdominal walls, which are rather thin and flabby, can be readily felt. When she speaks a light hectic flush comes upon her cheeks, and the same shows upon the cuticle of other parts of her body upon slight pressure. She is very nervous, cries readily, and bemoans her fate continually. The paroxysms referred to come on every third or fourth day, so that she is hardly relieved from one when the other begins to set in. They come in this wise: She becomes restless, her heart begins to beat more quickly; her restlessness grows greater, and the rapidity of her heart's action increases until it palpitates almost tumultuously. These palpitations are, according to her attending physician, very evident to the observer, and the speed of the heart's action proven by the great increase in the number of pulse-beats. With this there is some dyspnœa, though not of marked character. A great fear, a dread of something dire impending, comes over her, her nervous

* This incident of her history I learned only after I had been in attendance on her for some time.

excitation reaches its climax; she is almost beside herself, and wants a thousand things done at once to relieve her. She says she has noted distinct pauses in her heart's action, and this has been a source of fear to her, lest in one of these pauses the heart may stop permanently. She has uneasy sensations in her stomach, and, with them, what she describes as a "flicking" sensation, which travels from her stomach to her heart, and stands in some, to her indefinable, relation to the pause. She feels easier when she belches up, and to promote eructations takes essence of peppermint, Hoffmann's anodyne, Vichy (carbonated), etc.

She claims that her appetite is good, and she takes three good meals a day (the food being the same as is provided for the other members of the family), with some light things in between. She has been told to eat as much as she can, as it would do her good. Her bowels are constipated, rather obstinately so. She sleeps badly. She is very weak and cannot stand without support, and even then only for a few moments.

Examination. Tongue slightly coated with a white coat, and a few elevated papillæ at tip. Pulse weak, with a distinct intermission here and there. *Heart.* Superficial dulness markedly increased in its transverse extent, reaching on a level of the nipples from 1½ cm. to the right of the right sternal line to within ½ cm. of the left anterior axillary line. The usual evidences of an hypertrophy were not apparent on inspection. The sounds over the various valve regions are weak, but normal in character. The action of the heart is somewhat irregular; it sounded to the ear as if the heart were turning a somersault upon itself and then righting itself again. *Stomach.* The organ is normally located; no tenderness to percussion over any part thereof. There is some loss of muscular tone. For obvious reasons, no examination of the gastric chemismus was made. *Liver and spleen* in normal location and apparently normal. *Intestines* in usual position; no deviation. *Kidneys* in normal position; no mobility; functioning normal. (Repeated examinations of her urine were made by the physician in attendance.)

Diagnosis. That the heart is dilated is very evident, but otherwise I hold it to be intact. As to the paroxysms, they are in my judgment not at all dependent upon the condition of the organ. Whether originally they were determined by the general nervousness,* or were merely a part of the general manifestations of the disturbance of nervous equilibrium, I cannot at this late date say. As I see her now, it is very evident to me that the paroxysms are greatly responsible for her nervous condition, as they keep her in a constant state of fear for her life. As regards their causation, they are due, I am certain, to some irritative influence extraneous to the heart, and from the history as given, and the examination, I locate this in the stomach.

Treatment. In accordance with the diagnosis, the treatment was mainly directed to her *stomach*, and the principal point thereof was the diet. This was so arranged that while amply nutritious, it was easily digestible and unirritating. All undue distention of the organ was avoided by proper regulation of quantity, and undue formation of gases

* It must be borne in mind that at this time the special incident recorded in the history, and which was undoubtedly of the greatest etiological importance, was unknown to me, as already noted above.

avoided by the prohibition of various articles that tend thereto. Moreover, it included both roborants and tonics for the intervals between the meals.

Medication. A digestive agent, in the form of a preparation of pancreatine, was prescribed to assist the weakened stomach in its work and to hasten the digestive act; and nux vomica and Fowler's solution were directed, the former for its beneficial effect upon the muscles of the digestive tract, the latter for its inhibitory influence on the development of flatus, and both together as general tonics.

To promote the functioning of the intestinal tract, and at the same time stimulate the general circulation, which appeared to be rather sluggish, I proposed to give her abdominal massage.*

Furthermore, I explained to the patient that it was not so much her heart as it was her stomach that was troubling her; that she was in no danger and would certainly get well; that it would hasten her recovery greatly if she went out and took the air and moved about a little bit as her strength would permit; that she would thereby promote digestion, favor the discharge of flatus, and be invigorated generally. I suggested to her family that she be taken down every day to the beach in a carriage, and be allowed to sit there for a while inhaling the sea air.

Without going into the minutiæ of the daily details of the case, which are of no importance here, it suffices to say that the beneficial effects of the recommendations made, and which were fully carried out under the supervision of the attending physician, soon became manifest. For the first four weeks there was absolute freedom from attacks; then they reappeared, but at much longer intervals than previously—once in two to three weeks—and with diminishing severity. Her *morale* was much improved. She went out every day, the weather permitting, down to the beach, and got the benefit of the sea breezes; passed much of her time upon the veranda, and soon began to gain in flesh and strength. I saw her at first twice a week, and latterly at gradually lengthening intervals until September 30th. Though I ceased my attendance then, the treatment was continued on the lines laid down by the physician in charge. The intervals between the paroxysms grew still longer, and finally they disappeared altogether. With increasing general vigor the heart muscle gained in tone and drew together upon itself, as was shown by the greatly diminished area of cardiac dulness, which at the date last named was already very nearly normal.

Late in November I saw her again here in the city, just as she returned from a walk in Central Park, looking rosy and healthy. Her face had become rounder and her body showed decided evidence of filling out. During the period of treatment the diet was very much the same, *i. e.*, as to quality and quantity, though minor changes were made as the patient grew tired of one article and demanded something else instead. Massage was given twice a week for five weeks, and then once a week for a further period of three weeks, and then at irregular intervals as I saw her. As incidents in the case it may be mentioned that for a while she took fluid extract of cactus grandiflora as a heart tonic, but that later on, when the paroxysms reappeared, various other cardiac remedies—strophanthus, digitalis—were given during the attack.

* As described in my book "Constipation in Adults and Children." The MacMillan Co.

Occasionally some nervine, as tincture of valerian or zinc valerianate, was given.

In March, 1898, we had a blizzard, and on a certain Sunday the weather was particularly severe. While riding down town that day I saw my former patient out promenading on the sunny side of the street, in the vicinity of her residence. In June, 1898, when she left the city for her summer home, she weighed 135 pounds. When I saw her again she had long discarded her attendant. She is in excellent health, stout, and as I saw her some weeks ago she must be fully 165 to 170 pounds. She told me that she feels splendidly, that it does not seem to her as if she had ever been sick. She gets about, up and down flights of stairs, and takes long walks without becoming unduly fatigued; but that she must be careful in her eating, not to overeat or eat anything very heavy, for any infraction of the rules I laid down for her makes itself felt at once about her heart.*

2. By Contiguity When the stomach is empty it is collapsed upon itself. When food is taken in it distends in all directions, and as the ingestion continues the distention increases. The greater cul-de-sac rises higher and higher and, pushing the diaphragm before it, may reach even to the upper border of the fifth rib, and is then in close proximity to the heart. As the latter contracts and lengthens out its apex is forced into the distended segment of the stomach to a greater or lesser depth, according to the degree of distention.

As indicated by the pressure curve, this is the normal process; and when the heart is healthy, and therefore possessed of normal force, and there is no marked overfilling of the stomach, there is no interference with cardiac function. When, however, the heart has sustained permanent damage, as in chronic valvular disease, and its force is therefore more or less weakened, it cannot drive down the apex into the distended stomach to the extent required by its lengthening out, and the systole becomes imperfect, and the following ones more so. As a result of this the ventricular cavities are not sufficiently emptied, the blood in the auricles is dammed back by that retained in the ventricles, and the whole organ becomes surcharged with it. The consequence is the suffocative paroxysm.

Case II.—October 22, 1898. M. B., aged thirty-two years; clerk; married; four children. Five feet five inches in height. Weight about 108 pounds. Went through the various infantile ailments—scarlet fever, measles, etc. About seventeen years ago he had an

* A very interesting point in this case and one that attracted my notice quite a number of years ago in the case of another patient, recorded in my paper on "Nervous Dyspepsia," and to which I will merely call attention, without any further discussion thereof here, is this: As seen from the history, the lady before coming under my care ate a fairly large amount of food, a quantity sufficient for a healthy, active person, and though she took no exercise, did not vomit, had no diarrhœa, she grew thinner and thinner. After being placed in my charge, with the quantity of food reduced fully one-half and with more outdoor exercise, and therefore greater oxygenation, she began to gain and to put on flesh as recorded. The question suggests itself—"What became of the surplus energy of the food then taken?"

attack of acute rheumatism. Two years later it was noted that he had cardiac trouble. He was seen in the course of time by various eminent practitioners of the city. Latterly he developed attacks of dyspnœa, which continued to come on with increased frequency. After almost every meal he would have such an attack, and frequently of so grave a character that messengers would be dispatched in all directions to bring in a physician. In the summer of 1898 he went to the mountains, and while there was greatly improved as to the suffocative attacks; but, on the other hand, his bowels became very loose. Almost immediately after eating, and sometimes before the meal was finished, he would have to go to the closet. He had thus four or five large evacuations per day. Since his return home his suffocative attacks have recurred, and he still has a tendency to looseness of the bowels, though not as great as before.

Status Præsens. Very much emaciated, as already indicated. Face has a bluish tint, and is expressive of suffering. His appetite is good, and he eats the usual meals as they are served to the family. His bowels are rather loose, and he has occasional attacks of profuse diarrhœa. He has paroxysms of dyspnœa, mainly after meals; sometimes so severe that he thinks his end has come. Occasionally, uneasy sensations in the stomach. He feels very weak, and though he gets about and goes to the store, it is mainly by force of will; for when there he cannot do much work, and sits about most of the time.

Examination. Tongue fairly clean; teeth good. Pulse feeble, slow, irregular, and with distinct occasional intermissions. *Heart.* No heaving of præcordium. Apex-beat in sixth intercostal space to the right of the left nipple line, and somewhat fluttering in character. *Superficial* dulness of normal extent. Over the left apex a soft, rather blowing murmur, systolic in rhythm; does not travel to the left or upward and is not heard at the back; can be heard to the right as far as the right apex; can be heard with greatest intensity a little higher up, over the mitral valve region. At the base, to the right of the sternum, another murmur, also systolic in rhythm, is noted. This travels upward a little, but seems to be propagated downward, also about half-way to the right apex. The heart's action, on the whole, is rather weak, and the various sounds and murmurs are differentiated with some difficulty. *Stomach* normally located, normal in size. No tenderness over any part thereof. An examination of the chemismus not attempted. *Liver* and *spleen* normally located and apparently normal. *Kidneys*, so far as can be judged by a careful examination of the urine, healthy.

Diagnosis. Aortic obstruction and mitral regurgitation. This was confirmed by subsequent examinations when the patient had gained in strength and the heart in force, and its sounds and murmurs had become more distinct. I also learned subsequently from a physician who had seen him at a much earlier period that the trouble at the aortic valves was the primary one. The paroxysms of dyspnœa (which he thought altogether due to some stomach trouble, and therefore came to me) are due to the overfilling and consequent overdistention of the stomach and mechanical interference thereby with the functioning of the heart. The weakness of the heart as well as the general debility I ascribe to greatly impaired nutrition, and particularly to the looseness of the bowels. The diarrhœa is, as I view it, the result of impaired gastric digestion and the irritation of the intestinal tract by the pouring out

into it of the insufficiently digested and therefore insufficiently prepared food masses. No doubt intestinal digestion is itself impaired by this same irritation, and this also contributes to keeping up this looseness of the bowels.

Treatment. The main feature of the treatment, and the one to which, as I told the patient, I attached the greatest importance, because it meant better assimilation and but little loss, and therefore invigoration, was a proper diet—a diet that would nourish, while at the same time it would give rise to no mechanical interference with the action of the heart, and would not irritate the bowels. A diet list keeping these points in view was arranged for him. *Medication.* To assist the stomach he was directed to take a peptonzyme tablet with each meal (in the midst or immediately at its conclusion). To improve cardiac action, tincture of strophanthus, gtt. v bis die, was prescribed.

Under this treatment he began to improve at once. The suffocative attacks ceased, and did not reappear while he was under my care. The main trouble during that period was with the bowels, which would become costive and then again loose, with a tendency to diarrhœa; and with the loose stool, usually after a constipated one, there would come on some nausea and a feeling of weakness. Two or three times during this period he complained of some oppression in breathing, and each time it was, as he himself admitted, because he had eaten too many crackers at one meal. He excused himself, therefore, by saying that he was more or less hungry all the time and sometimes very hungry. He gained in strength, gained slightly in flesh, and there was improvement in his blood making. On November 7th the note says his pulse was 70, regular, and of much better force, showing that his heart had become stronger. The palpebral mucous membrane had decidedly more color. On December 28th he reported again, and the note says that he remarked that he was feeling better than he had felt for some years. This fair condition of the heart was sustained throughout the time I had him under my care. Occasionally he had rheumatic twinges, which were relieved by salol. In the course of the treatment, as time went on, changes were made in the diet, but the principles thereof were always maintained. The medication likewise underwent changes from time to time. Thus, after a while, strophanthus not appearing sufficiently effective, gave way to digitalis. For some time he took iron. Then there was medication *pro re nata*, tannigen or bismuth and tannic acid for the bowels. In February, 1899, he had a severe attack of influenza, with a tendency to pulmonary congestion. After the fever and cough had subsided a violent pain set in, which he located about the middle of the left clavicle, and it was some days before he was permanently relieved of this. About March 20th he was up in his chair, decidedly anæmic and feeble. He was put upon an iron tonic, and as the weather grew pleasant he gained in strength with fair rapidity. Then my connection with the case ceased.

It is beyond question that the diet chiefly was responsible for the improvement. By it alone the paroxysms were obviated, the great losses through the bowels stoppd, the whole system invigorated, and the heart in particular strengthened and put in a condition to withstand a disease (influenza) that not infrequently has broken down hearts that were in the best form.

CASE III.—October 24, 1899. L. J., aged twenty-six years; pharmacist; married; five feet three inches in height; weight, 133 pounds. He enjoyed good health, as far as he or his elder brother, who called with him, could recollect, up to six years ago. He had been working very strenuously in a down-town pharmacy—long hours, irregular meals, and a badly ventilated place to sleep in—and about the period stated he began to have pains in his chest, about the region of the heart, pains in his left and then again in his right arm. He called in a physician, who prescribed for him, and he got better. He was well for several years and then began to have pains in his stomach. He became very constipated about that time; he also noticed that his feet would swell. He placed himself under treatment, and the symptoms disappeared. For the last few months he has been very ill again, and has had several physicians to attend him. It has been said that his trouble was solely a gastric one, and was treated as such with alkalies, with acids, with the digestive ferments, with purges; and then, again, that his lungs were tuberculous, and the remedies suggested by this condition were prescribed. He has not been benefited by either form of treatment.

Status Præsens He is very sallow, has a sickly cast of countenance, and gives the impression of a tuberculous patient. He has no cough, occasionally gives a short hack, suffers much from oppression in the chest, with shortness of breath. He has pains in his chest. His appetite is now poor, and only light food agrees with him. His bowels are very much constipated, and he must take something to move them. No headache. Sleeps poorly, is awakened frequently with fits and starts. When his bowels have been thoroughly moved he sleeps much better.

Examination. Tongue clean; teeth good. Pulse 80, very shallow (low tension), and readily compressed. Lungs healthy. Jugulars on both sides pulsating strongly. *Heart.* Apex-beat in the fifth intercostal space and very diffuse, extending from 2 cm. to the right of the left nipple line to the left anterior axillary line. *Left apex.* Second sound rather loud and booming. *Right apex.* A blowing murmur, systolic in rhythm, distinctly heard here. Second sound booming as at left apex. At base the same booming in the second sound noted over the pulmonary artery, but not over the aortic region. Heart's action altogether rather weakly. *Stomach* normal, as far as location and size went, and as much as could be determined by palpation. Chemismus, for sufficient reasons, not examined.

Diagnosis. Tricuspid regurgitation. The dyspnœa and the feeling of oppression in the chest I was inclined to believe were dependent in a great measure upon undue distention of the stomach and consequent mechanical interference with the heart's action.

Treatment. He was put upon a diet almost the counterpart of that of Case II.; the very same in principle. As a tonic a glass of Wurtzburger beer was ordered. He was told to take life easy, to make no unusual effort, not to lift or carry, to avoid stairs as much as possible. Advised him to go to a small country town.

November 1st, He came in again to report. He is feeling splendid. Walks with a light and springy gait. He feels stronger, and has no trouble in breathing. Sleeps well. He made inquiry as to changes in diet, but I told him he must keep on as first directed if he wanted to continue to feel well. Re-examination of heart showed apex-beat stronger and much less diffuse than before. Pulse also of a little more force.

April 17, 1900, I was called to see him, and found him in bed in a semi-recumbent position, in bad condition. He was very much oppressed in breathing; could not lie down at all. He is nauseated; there is some œdema of the lower extremities. Pulse very feeble (curve showed but slight ascent). The history of his decadence was this: Following my directions strictly, he improved rapidly and gained in strength. All his symptoms disappeared and, as time passed on and he continued undisturbed, he concluded that he had not been a very sick man at all; that he was well now, and that it was useless to waste his time in idleness. He thereupon opened another large pharmacy in a down-town district, and worked from early morning until late at night—eleven or twelve o'clock. He also began to eat solid food, cautiously at first, and then a little more freely. Still he continued to feel well. Then came the Passover festival, and there was a cooking and a baking in his home, and many dishes of heavy calibre, as are the delight of his countrymen, were prepared for the festival, and when the festive days came around he ate freely, like a man who had starved for many days, and enjoyed all the good things hugely. The consequences were disastrous. The damage done by the overdistended stomach was irreparable this time. Though he improved somewhat, he could not get back to the condition he was in after his first visit to me last year. He remained weak; a walk of a block fatigued him. His breathing became more and more difficult; an œdematous condition with anasarca developed, and sometime in July of the same year he died, with manifestations of cerebral congestion.

It is thus very evident, and the histories here related amply demonstrate the correctness of the contention, that in cardiac affections the question of food is of momentous import to the patient. It is clearly shown, beyond the possibility of question, that he may be made thereby either miserable or suffering, or comfortable and well nourished, and, where this is possible, even permanently cured of his trouble, as it is adapted to his condition or not.

What is proper adaptation?

In the matter of regulating the diet for cardiopaths we must be guided:

1. By the well-established facts as to the nature of the various cardiac maladies, and

2. By the well-established facts in dietetics.

1. The cardiac ailments are classified into two great groups—the *functional* and the *organic*. In the first group the disturbances are mainly of an irritative character—*i. e.*, manifestations of an irritation set up somewhere in the system that has extended to and affected the nerves, innervating the heart. Nevertheless, the organ as a whole is intact, and competent in most instances to do its work normally or at least fairly well. In the second group the heart has sustained damage structurally. It has lost thereby part of its pristine strength, and is therefore more or less readily impaired in its functioning.

Again, while in the first group complete recovery is the natural out-

come, in the second group it is only a question of husbanding the strength remaining to the organ, whether deterioration, to the extent of incapacity to act in the manner requisite for the well-being of the whole organism, shall set in at an earlier or at a later period.

The indications arising to us, therefore, would naturally be that for the first group all *irritation*, in so far as the stomach is concerned therein, must be subdued and avoided; and, for the second group, that it is not alone irritation, but *mechanical interference* also, that we must prevent.

2. The study of dietetics and physiological investigation have taught us: That certain foods are more quickly digested than others. That certain foods give rise to a greater development of flatus in the stomach and intestines, and thus cause greater distention of these parts, than others. That certain foods are digested mainly in the stomach, while others tax this organ but lightly, their preparation for absorption and assimilation taking place elsewhere in the digestive tract. Again, clinical experience has demonstrated to us that the methods of preparation —*i. e.*, cooking—affect the digestibility of the article; that prepared one way it is readily and easily digested, while prepared in another it taxes the stomach to the utmost and not infrequently to the stage of exhaustion. Lastly, it has been shown that fluids leave the stomach much more quickly than do solids.

Having, then, the indications given, we must upon the basis of our knowledge of foods and their digestibility, as stated above, so arrange the nutriment of the patient that it shall fulfil the requirements.

In accord with this I have formulated for myself certain rules, which are as follows:

1. As to Foods. *a.* All foods that have bulk must be excluded.

b. All foods that are flatulent must be excluded.*

c. Only foods that are readily and easily digestible are allowed.

d. All foods must be so cooked that their digestion is facilitated thereby, not impeded.

2. As to Meals. *a.* All meals shall be small so that the stomach is not taxed too much nor greatly distended.

b. The intervals between the meals must be so regulated that sufficient time is given the stomach to empty itself and to have an interval of rest before the next meal is taken.

Though, as already stated, the conditions are different in the two groups of cardiac diseases, nevertheless the same rules hold good for both, only their application is different. To illustrate this more clearly the following diet lists as directed for the patients of the various groups are subjoined:

* The reason therefor is evident: they distend the bowels greatly, keep the gases in the stomach, and thus cause pressure to be made upon the heart.

(*A*) Functional Disturbances. Case I.—6 A. M., glass of milk* (sipped slowly or eaten with a spoon). 8 A. M., one wineglassful of Hoff's malt, with iron; a dish of oatmeal, with milk. 10.30 A. M., glass of milk. 1 P. M., a small broiled steak or two small broiled chops (with a little horseradish as a condiment); one-half glass of water; a small slice of white bread; a little fruit-jelly. 3.30 P. M., one and a half tablespoonfuls of dry sherry (or Madeira). 4 P. M., one glass of milk. 6 P. M., wineglassful of Hoff's malt, with iron, one cup of milk, and a small slice of bread (if preferred, a small piece of broiled steak in place of the milk). 9 P. M., one and a half tablespoonfuls of Madeira. At intervals of three hours in the night, milk, one-half cup, and another dose of the malt and iron sometime between the hours of 12 M. and 6 A. M.

Two weeks later she omitted the milk at 6 A. M. and took it with her breakfast at 8 A. M.; also took the milk but once in the night and the malt with iron twice.

Six weeks later, when she was already very much stronger and greatly improved in every way, as she had grown tired of so much milk, she took coffee for breakfast, and in place of the oatmeal mush a soft-boiled egg.

The dietary here, by reason of the great emaciation and great weakness of the patient, was much more liberal (though still fully in accord with the above-stated rules) than I am accustomed to allow. In the cases related in my paper here several times already referred to,[6] and which in all essentials (except as to etiology) were the analogues of Case I., the diet was much more restricted. It was as follows:

7 A. M., one cup of milk and two small slices of stale white bread. (If the need therefor is felt, one-half cup of milk at 10 A. M.) 12.30 P. M., a broiled steak or two medium-sized chops; a little horseradish as a condiment; one-half glass of water; one slice of stale white bread. 4 P. M., a cup of tea, with milk and sugar (preferably, if patients do not object too strongly, chamomile tea made from German chamomile). 7 P. M., a cup of milk and two slices of stale white bread.

It is, of course, understood that with the disappearance of the cardiac disturbance, and as the stomach shows a ready and easy digestion, the diet is allowed to progress very gradually to that to which the patients have been accustomed, after this fashion: A dish of oatmeal will be allowed for breakfast in addition to what is already taken; then, as it is seen that this is well borne, and the patient complains of hunger, a baked potato with the dinner meal; later still, a little spinach or a little asparagus is allowed in place of the baked potato, and so on.

* It is always directed that a pinch of salt be put into the milk; it takes off the flatness, makes it more palatable, and seems to inhibit in a measure the formation of gases. If it appears indicated two tablespoonfuls of lime-water are also directed to be added.

The last meal to be enlarged is supper. However, the patients are warned to be careful for a long time and a strict observance of the following rules insisted upon:

1. As to Foods. All fried food of whatever character is prohibited.

All vegetables must be prepared after the plain American fashion; that is, they are first boiled in water, and when sufficiently soft are taken out and sliced or hashed up, put into some meat-broth, and allowed to come to a boil. No fats or browned flour allowed therein.

Of soups, only thin broths (without any fat therein), and even then only in small quantity, are allowed.

Of pastries, only the lightest puddings—rice, tapioca (made without any grease)—are allowed. (These must be permitted to get cold after their baking, so that the first heat shall be out; before being served they are warmed just sufficiently to make them tasty.)

2. As to Eating. All foods when eaten must be *only moderately warm*.

Never eat until full; always rise from the table feeling that you could have eaten a little more.

(*B*) Organic (Valvular) Disease. Case II.—7.30 A. M., one-half of one fresh egg; one-half cup of milk; one cracker. 10 A. M., a cup of milk. 12.30 P. M., a plate of lamb-broth thickened with rice. 4 P. M., milk. 7 P. M., lamb-broth with rice Before retiring, one and a half tablespoonfuls of dry sherry. When he complained that he could not get home for his lunch (noon), this meal was changed to cocoa and crackers. When he tired of the lamb-broth, after a while, chicken-broth was allowed instead. Likewise, when he tired of rice, the latter was omitted and the soup thickened with very fine noodles. When his bowels showed a tendency to looseness thick rice dressed with sugar and cinnamon was directed.

At one time in the course of my attendance, when he was feeling very good but complaining that he was always hungry, I allowed him to have a tablespoonful of finely chopped beef (which had been previously stewed in its own juice) put into the plate of soup; but it did not agree with him, was not well borne by his stomach and bowels, and had to be stopped after a few days.

Case III.—8 A. M., a cup of cocoa and two crackers. 10.30 A. M., a cup of milk. 12.30 P. M., rice or barley dressed with milk, or lamb-broth or chicken-broth or beef-soup thickened with either of the above cereals. 4 P. M., milk. 7 P. M., same as the noon meal. A glass of imported beer was allowed with his soup either at noon or evening.

The only arbitrariness in the diet in these two cases was as to the articles and the hours for meals; otherwise they were at liberty to substitute one meal for the other, as their tastes and their conveniences made preferable.

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A CONTRIBUTION TO THE STUDY OF PRIMARY SARCOMA OF THE TAIL OF THE PANCREAS.[1]

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IN making a diagnosis of an abdominal tumor, two fundamental facts must be considered. First. From what organ does the tumor grow? Second. What is the nature of the growth? *Qui bene diagnoscit bene curat.*

We all know that it is not always easy to detect from what organ in the abdomen a tumor grows, especially if it be very large and occupies a great part of the cavity. Nor can we often discern the pathological nature of the growth. In fact, it is frequently impossible, unless attended with exploratory puncture or incision.

Neither can we by our methods of examination, inspection, palpation, percussion, and auscultation always arrive at a correct topographical diagnosis, because the consistency of neoplasms is frequently misleading.

With no organ of the abdominal cavity is the diagnosis of a tumor attended with greater difficulty than those having their origin in the pancreas. Its deep position, its close proximity and intimate relation with other viscera, such as the liver, stomach, duodenum, spleen, and kidney, make it extremely difficult.

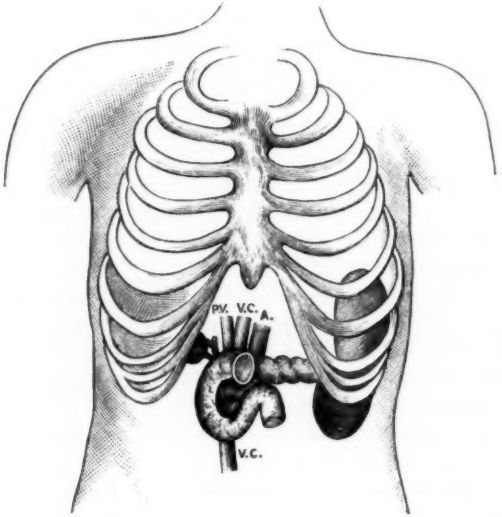
The situation of a tumor in the head, body or tail, if large enough, produces clinical symptoms, which vary according to the pressure exerted upon the underlying or contiguous organs or vessels in these localities. It is therefore clinically important to remember the close relation of this organ to the large vessels posteriorly, such as the aorta, inferior vena cava, portal vein, and the common bile duct; to the

[1] Read before the Metropolitan Medical Society, December 17, 1901.

stomach and duodenum, which lie anteriorly; to the horseshoe portion of the duodenum, which embraces its head to the right, and to the spleen, kidney, and suprarenal gland, which lie to the left.

A tumor affecting its head may press upon the bloodvessels mentioned and give rise to œdema, ascites, or persistent jaundice. A tumor growing from the body may compress the stomach or duodenum and give rise to dyspeptic or stenotic symptoms. A neoplasm springing from the tail, if of large size, may so simulate growths of the kidney or spleen that often erroneous diagnoses are made. This is especially so, as tumors of the spleen and kidney generally grow forward and toward the median line.

FIG. 1.



Of the known tumors which involve the pancreas, cysts, carcinoma, adenoma, sarcoma, and lymphoma have been found in the above order of frequency. Of the solid growths, carcinoma is the most frequent, sarcoma the least. Primary sarcoma is of the rarest occurrence.

There are recorded in the literature but twenty-one cases of sarcoma of the pancreas found either at autopsy or operation. Of this number in five there is an element of uncertainty as to their being true sarcoma, in ten only was the neoplasm noted as occurring positively primarily in this organ, while in the remaining six the histories are not complete and do not indicate whether the origin was primarily in the gland.

Of all these cases, in but three (those of Blind,[1] Routier,[2] and Witzel[3]) was the tumor found situated in the tail of the gland. To these three must be added the one whose history will be given further on.

Thus, after a careful perusal of the literature on this subject, there are only four authentic cases of sarcoma of the tail of the pancreas. Perhaps the infrequency of this occurrence may make the subject of the paper all the more interesting.

Carcinoma of the pancreas has been most frequently found. As the symptoms of a neoplasm, no matter of what pathological nature, are generally those due to pressure, a few of these that have been observed in cancer will also obtain when due to the presence of other solid growths. The symptoms, though, let me say beforehand, are not distinctive.

If the growth is in the head of the pancreas, pressure on the underlying vessels will produce ascites or œdema from stenosis of the portal vein or inferior vena cava. If the common bile duct is compressed, a slow but persistent jaundice develops, with sometimes enormous distention of the gall-bladder. It is in these cases where Courvoisier's law is exemplified, namely, closure of the ductus choledochus from pressure of a tumor, as a rule, produces enlargement and distention of the gall-bladder, while in stenosis due to the presence of stone the gall-bladder is found small and contracted. This rule, though, is not without exception, yet it occurs so frequently that it has a diagnostic value.

Closure of the pancreatic duct by the neoplasm intercepts the discharge of pancreatic secretion into the intestine, which may be recognized by the peculiar fatty character of the stool, known as steatorrhœa.

By pressing upon the solar plexus, pain in the epigastrium is produced. This may be dull, continuous, and occasionally paroxysmal and radiating. If in conjunction with a palpable tumor, and the above-mentioned symptoms present themselves, a diagnosis of growth is highly suspicious.

There may be evidence of pressure on the stomach and duodenum, characterized by dilatation of these organs and constipation. Or the growth may involve these structures, and by erosion produce intestinal hemorrhage.

Depending upon how much of the organ is destroyed, sugar may or may not appear in the urine.

One of the most characteristic symptoms is rapid emaciation, with cachexia and weakness. Whether this be due to the general condition found in malignant growths as a rule, or whether involvement of this organ produces disturbances in its function, interfering with nutrition and thereby contributing to the rapid emaciation, is a question that has not been solved.

These clinical symptoms are but seldom so very decided as to

justify a positive diagnosis, but if several are evident and a tumor can be felt, we may be reasonably suspicious of malignant neoplasm of the pancreas.

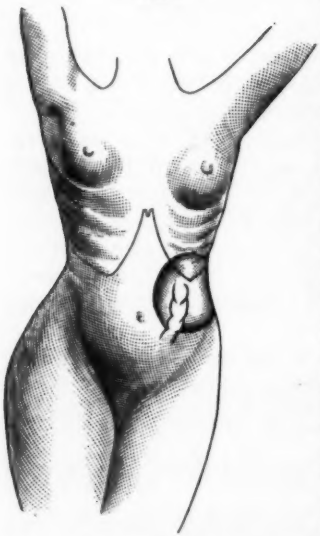
Up to the present time there are no individual pathognomonic symptoms which can with certainty be referred to malignant growth of the pancreas.

In the history of the case I am about to present there was rapid emaciation, pain and tumor, evidences undoubtedly of malignant growth. The peculiar situation of the neoplasm misled suspicion of pancreatic involvement, consequently examination of the stool was overlooked. Perhaps this may have given an important clue. The urine contained no sugar.

One can readily understand how difficult it was to make the proper diagnosis from the following:

Mrs. S., aged fifty-one years, married, four children. Up to six months ago was apparently a healthy woman. At about this time she complained of pain and a feeling of heaviness in the left hypochondriac region, radiating downward. She commenced to lose flesh and strength, and noticed a gradual swelling of her left side. There had been no nausea, vomiting, or dyspeptic symptoms. When I saw her the first time, about the end of September, her condition was as follows: Very cachectic and extremely emaciated, a dry skin but no icterus; her appetite poor; no nausea, pyrosis or vomiting; slightly constipated. She complained of pain in the epigastric and left hypochondriac regions, with great loss of strength and weakness in her limbs. There were no ascites or any œdema. The abdomen on the left was distended by a tumor. The liver was not enlarged, and no protuberances evident. The gall-bladder was not distended nor palpable. The urine was normal in color, no sugar, but contained albumin, epithelial casts, a slight amount of blood, with a number of small round cells. The arteries were sclerosed, pulse frequent and weak. Organs of respiration normal, heart sounds weak, a slight temperature of 99.5° in the rectum.

FIG. 2.



On inspection and palpation the tumor was found to extend from below the ribs on the left side down to an imaginary line drawn across the abdomen at a distance of 5 cm. below the umbilicus.

Its breadth extended from the linea semilunaris outward toward the

lumbar region. Percussion elicited flatness over the whole of this mass except along an area corresponding to the descending colon, where tympanitic resonance was marked. The tumor was slightly movable, non-adherent to the abdominal wall. It gave a feeling of semi-fluctuation, and as dulness merged from the tumor on to the spleen and kidney it seemed to be connected with these organs.

Digital examination of the vagina revealed the pelvic cavity free.

On account of the sense of semi-fluctuation, an aspirating needle was inserted, and blood with a few shreds withdrawn; the shreds on microscopical examination proved to be connective tissue and a mass of round cells.

Blood examination drawn from the finger yielded 40 per cent. hæmoglobin. Moderate leucocytosis. No count was made. No plasmodia. The cellular elements of the blood showed no evidences of splenic disease. Tumor of the spleen was therefore easily excluded.

The size and rapidity of its growth inclined me to the belief of its malignancy. It had a sense of semi-fluid consistency, and, being situated in the region where kidney tumors are generally found, I was prompted naturally to attribute its origin from this organ. This belief was in a great measure fortified by careful percussion and palpation in this region. Diagnosis of sarcoma of the kidney was therefore made.

An exploratory incision was advised, with the idea of removal if possible. Accordingly on the 12th of October an incision 15 cm. long was made from the lower border of the ribs along the linea semilunaris. My plan was to attack the tumor transperitoneally. As expected, the growth was found to be retroperitoneal, the size of a child's head, covered by omentum and mesentery. The descending colon lay on its anterior aspect intimately connected by dense adhesions, the stomach was pushed to the right. The surface of the neoplasm was nodular and covered by an immense number of dilated vessels. Its consistence was partly hard, partly soft and fluctuating. In attempting to lift it out of its bed of dense adhesions it partly ruptured, and soft grumous material escaped. It was impossible to shell it out from its adhesions to the neighboring vessels.

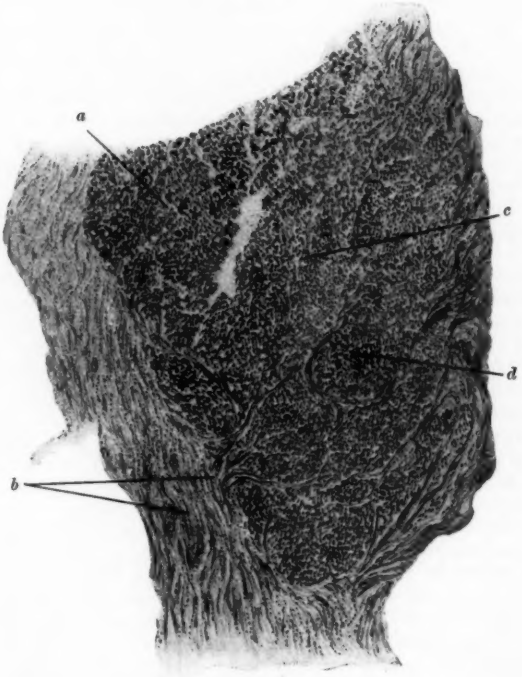
In its depth it was found to have grown from the tail of the pancreas, being merged into the kidney and spleen, both of which seemed to be embedded in its substance.

On account of the enormous difficulties encountered, and recognizing the impossibility of its removal, further operative interference was abstained from. The patient died soon after.

Pathological Report. Autopsy made by Dr. E. Schnaper, pathologist to the Lebanon Hospital. Inspection: Body emaciated; rigor mortis partially established; no œdema. Thorax, lungs: slightly congested and œdematous. Pleura: Both lungs bound down behind by old adhesions. Heart: Pericardium contains about one drachm of clear serum; left ventricle wall thickened; cavity small; muscle pale. Aortic and mitral valve normal; right ventricle wall thin; cavity slightly increased in size. Pulmonary and tricuspid valves normal. Abdominal cavity: Peritoneum, normal. Omentum free and contains only a small amount of fat in its meshes. Mesenteric lymph nodes enlarged, varying in size up to 1½ cm. in diameter. Firm in consistency, the cut surface showing the same consistency throughout. No other lymph nodes of the body were found enlarged. Liver: About

one-half inch below the free border of the ribs; enlarged, firm, yellowish in color. Gall-bladder: Distended with bile; normal. Common bile duct pervious. Spleen: Diminished in size; capsule wrinkled, firm in consistency. Kidneys: Smaller than normal; capsule adherent; surface granular; cortex irregular; markings distinct. Suprarenal capsules, normal. Stomach and intestines, normal. Pancreas: A large, partly hard, and partly soft tumor was found situated in the tail of the gland. The rest of the pancreas was firm throughout; no areas of softening. The pancreas and tumor weighed 2000 grammes.

FIG. 3.



Microscopical structure of tumor. Leitz Obj. 3. Oc. 3.
a. Capillary vessel. *b*. Connective-tissue stroma enclosing bloodvessels. *c*. Capillary vessels. *d*. Mononuclear and polynuclear cells.

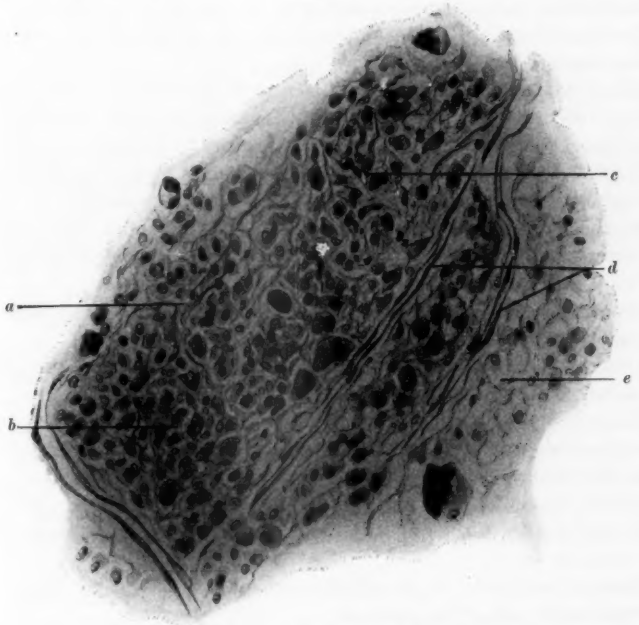
The tumor measures 18 cm. in length, 9 cm. in width, 60 cm. in circumference. Its surface shows irregularities which stand out as firm nodules. These, upon examination, were found to be lymph nodes incorporated in the growth. Firm connective tissue makes the external covering of the tumor. Upon cutting into the same it is seen to send in processes which surround grayish areas which are masses of cells. The length of the pancreas from the head to the border of the tumor is 16 c.m., its width 5½ c.m., its thickness varies from 1½ to 3

c.m. There is the same form of growth distributed throughout the whole of the gland.

Microscopical Examination. Sections were taken from various parts of the tumor, from the pancreas, and from the left kidney and spleen. The structure of the tumor reveals a fine, fibrous, reticulated network, in the meshes of which are a large number of small mononuclear round cells whose nuclei take the stain well. (Fig. 3.)

Very large cells, some mononuclear, some polynuclear, with large oval nuclei rich in chromatin, staining deeply, are also present in large numbers. (Fig. 4.)

FIG. 4.



Detail structure from Fig. 3. Leitz Obj. 6. Oc. 3.
a. Connective-tissue stroma. *b*. Tumor cells. *c*. Tumor cells, mononuclear and polynuclear. *d*. Capillary bloodvessels. *e*. Connective-tissue stroma.

The fibrous stroma, more prominent in some places than in others, is in direct relationship with the cellular structure. This stroma is highly vascular and shows capillaries with distinct walls. Parts of the tumor have undergone coagulation necrosis. In places small hemorrhages are seen to have taken place in the tumor. Lymph nodes: Increase of the cellular element as well as an increase of the reticulum. Left kidney shows no involvement of the neoplasm. Spleen free from any sarcomatous infiltration. Diagnosis, mixed-cell sarcoma.

Nearly all the latest writers have commented upon the rarity of primary sarcoma of the pancreas.

Senn[4] states that only a few cases are on record.

Oser[5] states that the infrequency of primary sarcoma may be inferred from the fact that such recent and well-known text-books on pathological anatomy as Orth's,[6] Birch-Hirschfeld's,[7] Ziegler's[8] and others dismiss the subject with but few remarks by saying that it is exceedingly seldom found.

Körte[9] says that primary sarcoma of the pancreas is of very rare occurrence.

Lancereux[10] mentions that connective tissue neoplasms of the pancreas are very rare, though several cases of sarcoma are recorded.

In the literature so far as I have been able to gather, primary sarcoma is exceedingly rare.

The first authentic contribution was made by Paulicki,[11] who, at an autopsy on a patient dead from phthisis, found a small round-celled sarcoma of the pancreas. This was supposed to be primary.

Segre[12] found that of 132 tumors of the pancreas, 2 were sarcoma, but he does not mention whether these were of primary or secondary growth.

In the pathological institute of Kiel, Rhode[13] observed only 3 cases of sarcoma of the pancreas with sarcoma in other organs, but whether primary in the gland he does not mention.

Senn, in his *Surgery of the Pancreas*, contributes a case of medullary sarcoma observed by Mayo.

Sidney Martin[14] demonstrated a case of primary sarcoma of the pancreas before the Pathological Society of London.

Litten[15] reported an interesting case of primary sarcoma of the pancreas in a boy aged four years, with extensive metastasis. The growth was confirmed as a primary neoplasm of the pancreas by Virchow.

Blind[1] showed before the Anatomical Society of Paris, 1894, a primary sarcoma of the tail, with metastasis in the liver, in a man aged seventy-four years.

Routier[2] enucleated a lymphosarcoma which seemed to have developed in the tail of the pancreas.

Neve[16] described a sarcoma of the pancreas which involved the pylorus.

Chvostek[17] observed a case of the pancreas and kidney with many metastases in other organs, but it is not positive whether he was dealing with a case of primary sarcoma of the pancreas or not.

Krönlein[18] operated on a woman, aged sixty-four years, for pyloric carcinoma, which at operation was found to have been a growth involving the stomach, pylorus, and upper portion of the duodenum, and springing from the head of the pancreas. The patient died three days afterward.

Autopsy showed an angiosarcoma of the head. The body and tail of the gland were free from the disease.

Schüler[19] mentions from the Greifswald clinic a case of hemorrhagic sarcoma of the pancreas in which the neoplasm had eroded the pancreatic artery, causing a hæmatoma in the tumor. From this erosion into the artery multiple sarcoma metastasis occurred.

Michaelson[20] reported a case from the Wurzburger Pathological Institute which he considered a mixed tumor, namely, carcinosarcoma.

Baudach[21] described a case from the Pathological Institute of Freiburg, in which he was doubtful whether from the histological examination the tumor originated from the glands of the structure or connective tissue. He called the tumor an angioma myxomatosum (cylindroma).

Bonnamy,[22] in a thesis entitled *Étude Clinique sur le tumeurs des Pancreas*, records a case of Ingalls'[23] of sarcoma of the pancreas, liver, and gall-bladder, which, from the history and anatomical findings, seemed to have originated from the pancreas.

Briggs[24] reports a case in which he states he had to deal with a spindle-celled sarcoma originating from the wall of an hydatid sac of the pancreas. Körte[9] doubts this diagnosis of sarcoma from the unsatisfactory microscopical examination, and states that he knows of no instance where sarcomatous degeneration occurred from the walls of an echinococcus cyst.

Witzel[3] describes an interesting case of retroperitoneal tumor involving the tail and body. The head was not affected. Microscopical examination proved the neoplasm to be a spindle-celled sarcoma. This was extirpated, but the patient died soon after. As no autopsy was made, it would be difficult to class it as one of positive primary growth.

As was mentioned in the beginning of this paper, and as was gained from the histories, in but three, Routier's, Blind's, and Witzel's, was the growth found in the tail. Blind and Routier's were primary in the tail, Witzel's doubtful. To these two may be added the case which is the subject of this paper.

This, then, makes only three authentic cases of primary sarcoma of the tail of the pancreas that I have been able to collect from the literature on this subject, namely, Blind's, Routier's, and my own. It is probable, since the literature of primary sarcoma of this gland dates back only to 1868, many cases of this rare and interesting disease were not recognized as such before, on account of the imperfect histological knowledge of these growths.

The diagnosis of pancreatic sarcomata, as of all intra-abdominal tumors, is a matter of much uncertainty.

Until further experience and investigations of many more cases from which we can gather some positive symptoms which may point to pancreatic growth have been made, our diagnosis can only savor of probability. I do not think we can be far from wrong in making a diagnosis of retroperitoneal growth, neither do we often fail in recognizing

malignancy from benignancy. But so far as locating the neoplasm or recognizing its nature up to the present time can only be conjectured.

To summarize: The difficulties in the diagnosis of malignant pancreatic tumors are so numerous and great that we rarely find a case in literature where a correct diagnosis has been made before operation or necropsy.

All or several of the symptoms above mentioned, together with the anamnesis, may lead to a probable diagnosis.

Recognition in the living of the nature of the growth is almost impossible.

Tumors of the pancreas are of the greatest interest to surgeons, as it has been only of recent years that operations have been made for their removal.

For surgical intervention the most important symptom is a palpable tumor.

Cysts have been incised and their contents evacuated.

Less frequently, however, have solid growths offered opportunities for surgical interference.

Removal of solid tumors with a portion of the gland itself is exceedingly dangerous and rarely successful. Even if it were possible to extirpate the gland, aside from the insurmountable difficulties on account of the bloodvessels and close proximity of the neighboring organs, the surgeon would not be justified, because, as Minkowski has shown, the entire removal of the gland is followed by rapid and fatal diabetes.

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THE CLINICAL SIGNIFICANCE OF A CHRONIC URETHRAL DISCHARGE.

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The time-honored custom of designating as "gleet" all chronic urethral discharges has for some time been recognized by genito-urinary surgeons to be a popular error, inasmuch as it does not accurately express the pathological conditions producing such discharge in all cases. As a matter of fact, three different forms of chronic urethral discharge are observed, each dependent upon a distinct pathological condition for its cause, and each requiring for its cure a separate and distinct line of treatment. The one most frequently observed is that to which the name "gleet" is properly given—a term which in its true significance is employed to describe a chronic discharge appearing at the meatus, scanty mucoid or mucopurulent in character, gluing together the lips of the meatus, yellow or yellowish-gray in color, staining the linen, and found upon microscopical examination to be made up of pus, epithelium, and fibrous shreds. This condition is well understood to be a direct result of chronic gonorrhœa, and depends upon the presence in the urethra of one or more localized areas of chronic inflammation with consequent exudation. As demonstrated by Finger, this pathological process may be limited to sharply circumscribed areas, superficial in character, involving merely the mucous membrane; or, in more advanced cases, there may exist involvement of the submucous tissue, with subepithelial thickening, constituting what are commonly described as "strictures of large calibre." Again, in protracted cases, secondary sclerosis occurring at the site of these granular patches, we have a resultant gleety discharge dependent upon a true organic stricture. In the large number of cases where gleet results from a chronic inflammation in the posterior urethra it will usually be found that many of the crypts and acini of the prostate gland are involved in the process, constituting the condition known as chronic follicular prostatitis.

The urine in true gleet is generally clear, and will be found to contain clap shreds in abundance, which fall rapidly to the bottom of the glass, and when stained and examined with the microscope are found to be made up of pus-cells, rarely containing gonococci, epithelium, mucus, and fibrous shreds.

Another form of chronic urethral discharge quite frequently observed is that first described by S. D. Gross, and known as prostatorrhœa.

Considerable confusion still exists among medical writers on the sub-

ject as to just what clinical condition should be embraced under the term prostatorrhœa. Gross, in his original description of the affection (1860), states that it "consists of a colorless, transparent discharge, occasionally containing pus, liable to be confounded with gleet, making a decided stain upon the patient's linen, and occurs as a result of a chronic inflammation of the glandular elements of the prostate gland." Sturgis[1] contends, however, that Gross in the above statement has confounded chronic prostatitis, prostatorrhœa, and urethrorrhœa. In support of this opinion, he states that "the secretion from the prostate gland is a thin fluid, cloudy, sometimes milk-white;" again, "the discharge from the prostate in a genuine case of prostatorrhœa is never purulent, and when it is the affection is a prostatitis, acute or chronic, but not a true prostatorrhœa."

These statements are in direct accord with such an authority as Fürbringer, who says that "the secretion of the prostate as obtained by digital pressure from the rectum is never transparent and mucous, but is milky in character;' furthermore, he is of the opinion that "only one form of prostatorrhœa exists—that which consists principally in the discharge of normal prostatic fluid."

On the other hand, Taylor[2] considers the affection only as an accompaniment of chronic prostatitis, and states that "there is a constant escape from the meatus of a clear mucous fluid or of a mucus mixed with pus and perhaps a little blood."

The writer considers that the term prostatorrhœa, properly applied, is used to designate a discharge of normal prostatic fluid, free from pus, arising from purely functional disorders of the prostate gland, disassociated from inflammatory changes, but consisting for the most part in congestion of the gland, with hyperæmia of the acini and hypersecretion of normal prostatic fluid.

The discharge which occasionally appears at the meatus in cases of chronic prostatitis, and which is found to contain pus, does not constitute a true prostatorrhœa, but should more correctly be spoken of as a "gleet," inasmuch as it is found as a secondary result of chronic posterior urethritis. The results obtained from stripping the prostate gland will materially tend to clear up any confusion which may exist in the observer's mind regarding the nature of the affection. Where the discharge into the urethra is the direct result of functional disorder of the gland, constituting a true prostatorrhœa, microscopical examination of the discharge after massage will demonstrate that it is entirely made up of prostatic fluid, consisting of amyloid corpuscles, refractive corpuscles, amorphous phosphates, similar to that described so fully by Finger, Fürbringer, Sturgis, and other authorities. On the other hand,

[1] Prostatorrhœa, etc., Journal of Cutaneous and Genito-urinary Diseases, June, 1898.
[2] Sexual Disorders of the Male.

where a given urethral discharge depends upon a chronic follicular prostatitis, examination of the fluid obtained by massage will reveal the presence of pus-corpuscles in abundance, in addition to the elements above mentioned; such a discharge should be regarded as a true gleet.

In the majority of cases the congestion of the gland, serving as the etiological factor in the production of prostatorrhœa, will be found to be a direct result of sexual abuse, either in the form of frequent masturbation or of excessive sexual indulgence. In addition to these, Sturgis adds as a potent factor in causing the affection the abuse of premature withdrawal at sexual intercourse. Upon this point it is well to note, however, that there is some difference of opinion. Vecki, for instance, asserts that in cases where "frauding" is practised the circumstances are more favorable for the man than for the woman, and that whatever phenomena result from such practice, they are those of neurasthenia, with loss of sexual desire, rather than congestive changes in the prostate gland itself. Sturgis further adds that prolonged riding upon bicycle or on horseback with improper saddle, is a frequent exciting cause of the affection.

In nearly all cases affected with prostatorrhœa, from whatever cause, rectal examination shows the prostate to be somewhat enlarged, tender upon firm pressure with the finger, and of a soft pulp-like consistency. As regards the appearance of the discharge, it is uniformly described by patients as "white of egg" in character, tenacious and viscid, slightly gluing the lips of the meatus together, rarely staining the linen. It is generally observed by the patient upon rising in the morning; occasionally the fluid escapes after some unusual exertion; in quite a number of cases it appears at the meatus upon straining at stool, much to the alarm of the patient.

The writer has found that, unlike true gleet, the discharge of prostatorrhœa is not constant through the day, but appears only at such times and under such circumstances as those just mentioned. This escape of prostatic fluid into the anterior urethra is undoubtedly due, as stated by Taylor, to an atonic condition of the compressor urethræ muscle. The urine in all cases is clear, free from clap shreds, but is apt to contain numbers of comma-shaped, fine, hook-like shreds (Fürbringer's hooks), which do not fall to the bottom of the glass, but float in the urine.

A third form of chronic urethral discharge, very apt to be regarded as gleet by the careless or inexperienced observer, is that to which the name urethrorrhœa or chronic urethral moisture has been given.

This term is used to describe a colorless, watery discharge which is constantly present at the meatus, rarely in sufficient amount to glue the lips together. The patient complains solely of a persistent dampness or moisture about the meatus, and upon opening the lips with the thumb

and finger—a manœuvre at which the patients with this affection get very expert—the meatus and urethra appear to the eye to be congested and to contain more secretion than should normally appear.

This condition is found in all cases to have developed as a sequel to a long-standing gonorrhœa, and is directly due to an atonic, relaxed condition of the capillary bloodvessels of the urethral canal. In White and Martin's work on *Genito-urinary Surgery* the affection is termed urorrhœa or urethral catarrh. It is here described as a "catarrhal discharge dependent upon a weak and leaky mucous membrane, and associated with no more serious pathological lesions than moderate congestion, which must be carefully distinguished from other post-gonorrhœal gleets; the discharge is bland, non-contagious, and local treatment, except by the mildest astringents, is distinctly contraindicated."

Examined microscopically, although it is almost impossible in many cases to secure sufficient discharge to obtain a "smear," it will be found to consist almost entirely of cylindrical epithelium and mucus. Urine in all such cases is invariably clear.

This condition will often be noted as one result of the vicious practice which patients who have suffered from chronic gonorrhœa fall into of "stripping the penis," for the purpose of noting the presence or absence of any urethral discharge.

The affection just described is not to be confounded with that spoken of by Fürbringer and Sturgis and termed "urethrorrhœa ex libidine," which is not constant in character, has no direct etiological relation to gonorrhœa, but is a direct result of sexual excitement.

	History of case.	Macroscopical appearance of discharge.	Microscopical appearance.	Results upon the discharge of sexual intercourse or use of alcohol.	Appearance of urine.
Gleet	Chronic anterior urethritis. Chronic posterior urethritis. Epididymitis. Prostatitis.	Yellow or yellowish-gray. Forms a crust ginging lips of meatus together in the morning. Linen distinctly stained.	Pus. Epithelium. Fibrous shreds Occasionally gonococci.	Discharge increased.	Clear or cloudy, containing clap shreds and pus.
Prostatorrhœa	Not necessarily any venereal disease. History of sexual abuse. Frequent masturbation. Onanism.	Milk white, appearing during sleep, or on heavy physical exertion, or at stool; does not glue the meatus, linen slightly stained.	No pus. Characteristic prostatic fluid. Amyloid corpuscles. Refractive corpuscles.	No effect.	Clear, containing small comma-shaped hooks
Urethrorrhœa	Chronic gonorrhœa. Practice of "stripping the penis."	Appearance simply of moisture in excess at the meatus.	No pus. Cylindrical epithelium mucus.	No effect after sexual intercourse. Very often improved by occasional use of alcohol	Clear.

As the treatment in each of these three varieties of chronic urethral discharge differs very materially, it is obviously essential that the physician should be able to arrive at a correct decision as to what particular form he is called upon to treat. To determine this point investigation should be made into: First, the history of the case; secondly, the macroscopical and microscopical appearance of the discharge itself; third, the effect upon the discharge of indulgence in sexual intercourse or alcohol; fourth, the character of the urine. The accompanying table is given as showing at a glance these various points in the differential diagnosis.

THE SANITARY MEASURES TO BE ADOPTED AFTER FLOODS.

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of New York.

The following paper is designed to set forth a few suggestions for the guidance of those who may be called upon to assist in safeguarding the health of communities which may be thought to be exposed to epidemic diseases by reason of destructive floods.

It is evident that information which may be useful in averting the consequences of flood has special significance to the people of the United States. Possessing an enormous territory, with a wide range of climatic and geographical features, it is not strange that such catastrophies should occasionally occur. The low, flat valleys of the Mississippi and its tributaries afford an imperfect opportunity for the discharge of the waters sometimes collected upon their immense drainage areas. On such occasions thousands of square miles are inundated. Villages are submerged, and great destruction of property results. The fact that these floods are anticipated has not been capable of reducing their hardship, as witness the almost annual overflows, which caused a loss in 1874 of $13,000,000, and the destitution in 1882 of 60,000 inhabitants of Mississippi.

Occasionally some of the streams of the Northern and Eastern States cause destructive floods, but their shorter, straighter courses and smaller flood-plains render such wide-spread damage as is common in the South and West impossible. Nevertheless, there have been destructive floods from such rivers, particularly in connection with the giving way of dams. Of this sort was the Mill River, Mass., disaster of 1874, and the Johnstown, Pa., flood of 1889.

Inundations from the sea have occurred on the low-lying coasts of the United States on several well-remembered occasions. Notable among coast floods have been those at Galveston in 1886, with a loss of thirty-eight lives and $5,000,000; the storm of 1893 on the Louisiana coast,

during which practically all the settlements between New Orleans and the Gulf were destroyed; the Sea Island flood, wherein 2000 people were killed, 20,000 rendered homeless, $5,000,000 worth of property destroyed; and the Galveston calamity of 1900, in which 8000 people were killed and $20,000,000 damage was done to property.

After the first shock of such disasters as those referred to the world is generally appalled by the news that pestilence is liable to break out at the scene of destruction. At Johnstown and Galveston great apprehension was felt that one or more of the acutely infectious diseases would appear among the survivors and rescuers. Rumors that pestilence had actually broken out found their way to the public press, where they threatened to do serious injury to the commercial interests which were already so seriously crippled.

It may not be unprofitable to inquire for a moment what reason existed for the popular apprehension, and to determine if possible wherein lay the danger, if any existed.

There is but brief information available concerning the sanitary aspects of the great floods of antiquity and the middle ages. They are obviously not connected in point of time with the great epidemics which visited the civilized world in those periods; nor do the facts at hand suggest that floods have ever been considered important agents in the generation or spread of infectious diseases. In point of fact, a belief in the cleansing power of floods is strongly implanted in the popular mind. The Bible story of the deluge is not inaptly held as the symbol of a remedy for the evils of corruption rather than a precipitant of disease. Why, then, should pestilence have been so greatly feared at Johnstown and Galveston?

It is probable that the fear of disease grew from a contemplation of the disorder and great destruction of life and property, the demoralization which was everywhere apparent, and particularly the want of sanitary control, which very soon manifested itself. Had an earthquake, for example, produced similar conditions of wreck and confusion, it is not improbable that the same fears of pestilence would have been experienced.

Undoubtedly the active source of infection was supposed to lie in the lifeless and decomposing matters which were associated with the wreckage. To the senses of the survivors and rescuers the odors of decomposition were a constant menace and active source of alarm.

As to the reality of the danger which is popularly supposed to exist in the presence of dead bodies of men and animals, little need be said to those who are familiar with modern views of the etiology of the communicable diseases. By them it is known that a foul odor is only rarely in itself a source of danger, while it is a most unreliable indication that disease-producing conditions are close at hand. According to

accepted theory, diseases which are capable of becoming epidemic are incapable of originating in foul or decomposing matters. Every form of infectious disease is produced by a specific agent peculiar to it. This agent or its progenitors has existed for an indefinite period, and is only developed in large proportions and with dangerous virulence within the body of a living host. Thus yellow fever, bubonic plague, typhus, cholera, etc., are bacterial diseases which occur only when the micro-organisms associated with them are carried by some means from one subject to another. Familiar vehicles for the transmission of infectious material in such cases as those which we are considering are water- and milk-supplies, flies, dust, and impure food.

It follows, if these views be accepted, that those who are compelled to handle the bodies of previously healthy men and animals killed by flood or other violence need have little fear of contracting any of the so-called filth diseases, no matter how far decomposition of the body may have proceeded. Nausea is the worst form of illness to be anticipated. And what is true of the bodies of men and animals is true of vegetable matter as well.

The conditions are different, however, when we have to deal with the remains of persons ill of, or killed by, disease. During illness and after death the excretions and surfaces of the person are frequently highly dangerous as sources of infection. Here are to be found the bacteria or special agents which are capable of reproducing the disease with which they have been associated. It is obviously important that contact with infectious material be avoided, that it be prevented from disseminating, and that its source should be as soon as possible removed. These ends are accomplished by isolating each case of sickness, disinfecting contaminated objects, and destroying infectious material as near its origin as possible. In the conditions which obtain after floods probably very few people will have been killed excepting those who were in health, while among the large number of persons who remain there may be some sickness. Therefore, as a general rule, it is safe to say that danger of pestilence lies not among those lifeless matters destroyed by the flood, but rather among the living.

After the destruction of their homes many of the flood sufferers of Johnstown and Galveston found shelter in camps. Under such circumstances it was inevitable that overcrowding should now and then have occurred, and that the attention given to such subjects as drainage, the disposal of waste, the procurement of pure food and water, the avoidance or destruction of insects, and careful supervision of the health of the survivors should have been for a time neglected. Nor is it to be wondered at that in the excitements of the hour the usual care for individual safety should have been relaxed. Physical and mental fatigue marked the condition of nearly every individual. We cannot

fail to recognize in these conditions important predisposing causes of disease. They were insufficient to produce an epidemic, but were well calculated to spread a pestilence should it break out. There was needed but a spark to kindle the flame of a greater disaster than had been wrought by the elements.

The spark was looked for among the large number of strangers who flocked to the scenes directly after the news of the calamities was spread abroad. The people who visited the wrecks were almost exclusively men of the meanest class—curiosity seekers, adventurers, thieves, and worse. They were drawn from all points of the compass, and generally came on freight trains or on foot. Their number was very large. They lived from hand to mouth, subsisting on supplies sent to the flood sufferers, without working and without responsibility of any kind. In view of the circumstances, it is extremely curious that none of the acutely infectious diseases appeared.

From the foregoing considerations the steps which should be taken to safeguard public health in thickly settled flood-stricken communities are fairly indicated. There is need of a strong sanitary organization, with a responsible head, to avoid epidemic, by removing the conditions which favor the spread of infectious diseases and to watch for cases of such sicknesses in their incipiency.

Who should be chosen to occupy the position of chief sanitary authority? By all means, the proper person is the health officer of the town, city, or county, if he is present and capable of exercising the onerous and exacting duties of the office. In disasters of so great magnitude as those cited it may be tnat the city and county health officers are unable to cope with the situation. It then becomes a question as to what other authority should be summoned to the scene. It is essential that a sanitary bureau be established promptly.

In the United States no help is more suitable in this emergency than that which the State health organization should be capable of furnishing, and it is appropriate that the Commonwealth should contribute its services in the event of such an emergency. It is to be regretted that all of our States have not such excellently conducted boards of health as to be capable of affording such prompt and competent services as are demanded under the circumstances which we have under consideration.

When the State is unable to accept control the United States Government may be appealed to. There is a fund placed at the disposal of the President and Secretary of the Treasury for use on such occasions as demand unusual protection to prevent the spread of epidemics. In the absence of a national board of health, the United States Marine Hospital Service is prepared to take the field at short notice to avert or put an end to any epidemic which threatens to invade the country. It should be remembered in this connection that the resources of the Gen-

eral Government are not available except when the danger is very real and of such a nature that the country at large is liable to be affected through the inability of local authorities to control the situation.

Having settled the question of authority, it will be desirable to establish headquarters for the direction of the sanitary organization. The confidence and co-operation of the flood sufferers should be encouraged from the outset. Much importance is attached to this point and to the desirability of distributing immediately and as widely as possible a knowledge of the purposes and methods as well as the powers of the sanitary bureau. Secrecy with regard to the real condition of the public health, such as has been sometimes practised with regard to the identity or presence of communicable diseases, is not considered a wise policy; cases of illness should be reported by their proper names and announced in an accurate manner. For this purpose it will be advantageous to issue bulletins.

A set of sanitary regulations for the guidance of the people may be issued to advantage, and should contain instructions as to the cleaning of premises, the repair of injured household effects, the disposal of garbage and other wastes, the methods of using deodorants and disinfectants properly, and the need for proper precautions in the matter of diet. With the idea of reducing the number of people to be cared for, as many as possible of those who are not usefully employed in the work of rescue should be advised to leave town for a few weeks' rest.

The scene of the wreck in the districts wherein camps have been established may be advantageously divided into sections, the limits of which, for convenience of reference, should be marked on a map. It is suggested that each one of these sanitary districts be made a unit for the operation of a small force under the direction of a minor sanitary officer, it being an advantage to encourage a spirit of emulation and amiable rivalry in the interest of greater efficiency among the various corps at work. It will be found desirable to keep a business-like record of the operations of the bureau, and for this purpose an office force of clerks will be useful. The operations which it will be necessary to carry on outside of the office can be accomplished through the aid of local help. Physicians and others whose former residence was in the locality will have the advantage of familiarity with the place and people.

One of the most important divisions of the work of the sanitary bureau will be the observation and direction of the flood sufferers in their efforts to look after their own health. A corps of responsible inspectors should be organized to move about among the people in a systematic way, to see that the regulations of the sanitary authority are properly carried out, and to supplement and interpret his directions by sensible counsel and advice. Cases of disease which are capable of becoming epidemic should be watched for by these men with the greatest

care, particularly in the cheap lodging-houses, camps, and other places where the evils of overcrowding and uncleanliness are most liable to occur. When a case of infectious disease is discovered the patient should be isolated and the premises thoroughly disinfected in accordance with the practices commonly observed in large cities with regard to the more dangerous diseases.

The water-supply and food provided for the sufferers and helpers should be inspected systematically. Wells believed to be contaminated should be pumped out, and either thoroughly cleaned or closed with an official seal. Unless the water-supply is wholly beyond suspicion, that part of it which is to be used for drinking and cooking should be required to be boiled.

In cleaning damaged houses attention should be given to the removal of slime, mould, or silt from floors, walls, and furniture. Carpets should be taken up and dried in the sun and beaten, or else destroyed. Upholstery, especially mattresses and cushions, to be preserved should be opened and sun-dried. Cellars should be pumped out, ventilated, and whitewashed. Fumigation will not be necessary in these operations unless the presence of disease germs is strongly suspected, in which event the use of formaldehyde is recommended.

Of the great variety of so-called disinfectants which will probably be sent to the scene of the wreck the most useful will be quicklime, chloride of lime, and carbolic acid. Although the public is tolerably familiar with the use of these chemicals, instruction should be given in the ways in which they may be employed to the greatest advantage, particular attention being given to the necessity of bringing about an intimate contact between the material to be treated and the agent, the desirability of economy, and the advantages to be gained by avoiding the necessity of using deodorizing and disinfecting materials.

In making a permanent disposition of decomposing or decomposable organic matters as much use as possible should be made of the opportunities afforded for incineration. The bodies of horses, cows, and other animals, garbage and excreta may be easily burned if first sprinkled with rosin. Bonfires may then be made over such material with fuel taken from the wreck. Condemned beds, carpets, furniture, etc., may be soaked with tar or oil before burning, to ensure complete combustion. In disposing of human remains burial is much to be preferred to burning, provided the graves or trenches intended for interment can be decently made and of a depth of at least six feet. All bodies disposed of in this manner should be placed in one locality, which should be at least one hundred yards from any habitation or well. Where insufficient depth of soil is found for burial in the usual way, quicklime may be used to advantage in the bottom and covering of the trenches, a few pailfuls of water being thrown over the top to ensure immediate action.

With regard to the removal of débris and cleaning about the scene of the wreck, it will be well to remember that the removal of infectious material or matters which are either actually offensive or liable to become so, does not constitute the whole duty to be fulfilled. An appearance of order and neatness is a condition greatly to be desired, since it makes for cleanliness and wholesomeness, and is in itself an outward evidence of that control and moral support which it is perhaps, after all, one of the highest functions of the sanitary bureau to maintain.

REPORT OF A CASE OF DERMOID CYST OF THE MOUTH; CRITICAL REVIEW OF THE LITERATURE.

By Charles Greene Cumston, M.D.,
of Boston.

Cystic productions in the tongue or the floor of the mouth have been divided into four groups by Streckeisen, according to whether they are subcutaneous—that is to say, more superficial than the mylohyoid muscle; between the geniohyoid muscles, or in their tissue; between the genioglossus above the geniohyoid muscles; and, lastly, in the concavity of the os hyoid. Out of all the cases that I have been able to collect I can find only one that appeared to be distinctly subcutaneous, while in those instances where the cystic production appeared superficial it will be found that they had not only pushed aside the mylohyoid muscles, but extended between the geniohyoid muscles, and even between the genioglossus. A more precise classification may be made if their points of origin are taken into consideration, and they may develop in any of the various tissue layers from the skin of the suprahyoid region up to the mucous membrane of the buccal cavity. Cases have also been reported of cysts situated in the tissues at the apex of the tongue or on the dorsum of that organ. In other instances the neoformation was so large that it distended the tongue, transforming it into a large cystic cavity. These cysts develop in size in indirect relation to the amount of resistance offered them by the surrounding structures, and consequently their precise anatomical site is frequently difficult to assign.

Gerard-Marchant divides dermoid cysts of the floor of the mouth into adgenien and adhyoidien, according to their adhesion to the lower jaw or to the os hyoid, and in fact these cysts oftentimes contract adhesions with these bones.

Streckeisen's classification would lead one to suppose that these growths are always attached to the os hyoid; but this is not the case in each and every instance, as will be seen by reading the report of cases appended to this paper. In one case the adhesions connected the growth to the bony insertions of the genioglossus. The classification

of Gerard-Marchant is faulty in that it only includes a restricted number of cases, because in a large majority these cystic productions are free of adhesions. When adhesions do exist they are usually composed of a very short fibrous band of varying resistance, while in other cases the growth is attached to the bone by a sort of thin, fibrous pedicle, which may contain a duct having a diameter of two or three millimetres; or, on the other hand, the adhesions may be of the consistency of fibro-cartilage containing a duct. In these cases the primary origin of the adhesions was due to the formation of the cystic process. Similar examples are found in congenital cysts of the neck, but they are most infrequent in those developing in the floor of the mouth.

When adhesions have been noted connecting the cyst with neighboring structures other than the bone, in most cases they were secondary and followed a suppurative process arising in the cyst cavity. The diagnosis of adhesions is hardly possible before operation is undertaken, either because these attachments have a weak resisting power or because their development is so feeble that they cannot give rise to any signs on palpation. Should the cyst and the os hyoid move together during deglutition it is a fair proof that adhesions exist between them. In some instances the tumor adhered to the lower jaw, but nevertheless moved with the os hyoid.

As to cysts of the tongue, they may appear to be superficial, but nevertheless they are lying beneath the muscle, and in this organ they are always separated from the mucosa by a muscular layer which may be reduced to an extreme thinness, but which is never wanting. When they develop toward the under surface of the tongue they invade the floor of the mouth, and can only become submucous by penetrating the space separating the genioglossus muscles.

These cysts may be divided into two groups, according to the structure of their walls and the nature of their contents, the mucoid and dermoid cysts. Mucoid cysts are of extreme rarity, and I have only been able to find three recorded cases. It is believed that they are derived from the canal of Bochdaleck. Their walls are composed essentially of two layers, the external one being a connective-tissue structure. The internal aspect is lined by a mucous membrane composed of cylindrical epithelium or of pavement epithelium. The epithelium in two cases was provided with cilia; they were absent in the third case, but this may have been due to a suppurative process which had invaded the cavity of the cyst before its extirpation had been undertaken. The contents of these cysts was a viscous fluid.

The histology of dermoid formations in the floor of the mouth is usually that of the skin. The lining membrane of the cyst has a basement layer of connective tissue on which rests the layer of pavement epithelium, arranged in several strata; this inner membrane

varies in thickness in different parts of the cystic cavity. The upper strata of epithelial cells are quite flattened, and as they have undergone a complete horny transformation their nuclei are wanting. They are very loosely connected—a fact which is particularly evident on the surface, where the single scales and flattened layers are on the point of desquamation, and they are very loosely connected with the remainder of the epithelium.

Next to the horny stratum will be found several layers of nucleated cells which correspond to the rete of Malpighi, the uppermost of which are somewhat flattened, but gradually become cubic and polygonal in shape, the lower layer of which rests on the connective tissue, and here the cells have almost a cylindrical form. I am not aware that sickle-shape cells have ever been demonstrated to exist.

The corium is composed of densely packed bundles of connective tissue, running parallel or at right angles to each other, and very tightly intermingled. Elastic fibres are also present. The lower strata includes large and small sebaceous glands as well as a large number of unstriped muscular fibres, either single or in bundles, and interspersed throughout the corium.

The general direction of the muscular fibres varies, but the majority run parallel to the surface of the epithelium, while others are more or less at acute angles with it. Here and there we find the muscular fibres running singly across the entire corium, and arranged very similarly to the erector muscles of the hair of the skin. Hair follicles are not usually found; but they must, in all probability, be present in the cyst walls, because this is demonstrated by the presence of hair in the contents of the cyst. The sudoriparous glands and papillæ are not to be found. In both cases the cyst contains a whitish-yellow, cheesy mass, and being the product of the cyst walls, is composed of horny epithelium and epithelium which has undergone a fatty degeneration as well as the products of decomposition and the secretion of the sebaceous glands.

According to our present views, dermoid cysts are congenital formations; that is to say, they are derived from epithelial germs which during fœtal life have become segmented off in some way or another, or which have reached a spot where, in extra-uterine life, epithelium is normally absent. This germ aberration or retention does not take place at any one particular spot of the ectoderm, but only at spots where a special process of development favors it, such as the fœtal sulci lined with the ectoderm. Now, when the ectoderm closes in, or when it enters into relation with other tissues for the purpose of forming certain organs, the epithelial débris may remain; and it is only this explanation that can be scientifically employed as the reason for the typical localization of dermoid cysts. According to this conception,

the point of origin of dermoid cysts in general must be marked out when the oral cavity and the limitrophous parts of the throat are developing. This formation commences somewhere about the end of the second week of fœtal life.

According to Hertwig, the formation of the blastodermata and the first process of segmentation are completed, and the human embryo essentially represents two long tubes, one of which is enclosed within the other, the inner tube being composed by the trophic germinal plate and the middle visceral dermic plate; while the outer, which is only separated from the inner layer by the abdominal cavity, is entirely composed of the ectoderm.

The oral cavity first becomes differentiated, and below the projection formed by the frontal part of the brain an inflection of the epithelium takes place on the ventral aspect of the head, which gradually becomes deeper and deeper toward the closed end of the cephalo-intestinal cavity, so that it is finally only separated from it by a thin partition —the outer epithelium and the trophic germinal plate.

Very shortly afterward this partition gives way and its fragments are turned back, and consequently an external communication has been effected, namely, the oral cavity. At the summit the latter is bordered by the frontal protuberance, laterally by the two maxillæ, and inferiorly by the mandibulary projections, which also represent the upper pair of branchial arches.

Simultaneously with these changes occurring at both sides of the region of the throat the four branchial arches make their appearance. Parallel with the mandibulary arches small indentations arise, which, by pushing aside the middle blastodermic layer, reach the surface and become connected with the epidermis. The epidermis, at the point of contact, dips down and forms a cleft so that a deep and a superficial branchial cleft are formed. They are only separated from each other by a thin epidermic membrane which runs between the clefts. The first branchial closes and forms the oral cavity, and below this is the first pharyngeal cleft, and below this are three other branchial arches and clefts.

Such being the embryonal formation of the throat and oral cavity, two possibilities suggest themselves to one's mind for explaining defects in the development of these organs. The first may take place when the lateral branchial clefts close up from above downward, or later on, at the time when union takes place between the branchial arches and clefts in the median line of the throat. The first process may give rise to congenital fistula of the neck; and, according to Roser, we can have four fistulæ resulting from an imperfect development of the branchial ducts, their orifices being found respectively in the anterior part of the region of the ear, the region of the os linguæ, the region of the larynx,

and the sternomastoid region. We also may trace back to this formation those cysts which are rather frequently observed under the mandibula, the os linguæ, and below and along the side of the sternocleidomastoid muscle; they are probably the débris of the branchial duct.

The clefts situated in those parts which face the intestinal cavity are coated with cylinder epithelium, while externally pavement epithelium is found; consequently the cysts contain either pavement or cylinder epithelium, or both may be present, according to whether the segmentation is a deep or a superficial one. Most frequently these cysts occur between the angle of the mandibula and the thyroid cartilage, especially those that are lined with pavement epithelium and which are commonly called atheroma, and also between the horizontal branch of the mandibula and the os linguæ. It is in this latter region that their origin can be more easily recognized. Pathological formations of a very similar character are also met with in the median aspect of the neck, although they are far more infrequent than those found on the sides. We also meet with certain fistulæ and cysts whose origin can only be explained by assuming a defective closing of the branchial arches, resulting in a retention of the epithelial germs. The fistulæ extend in front of the larynx and also in front of the os linguæ. The cysts are partly situated in the incisura jugularis, but the larger number are present under the tongue, in the floor of the mouth.

Hoffmeister divides these cysts into those that have their origin in the entoderma and those arising from the ectoderma. The former are said to be characterized by the thinness of their walls and the absence of hair. Dermoid cysts, however, are those most frequently met with. It is not easy to understand why dermoid cysts situated in the median line are less frequent than those found on the side of the neck, and why, if they do arise in the former situation, they do not occur in the floor of the mouth. For the present, at least, we can only assume that the conditions necessary for the formation of a congenital defect are more favorable on the side of the throat than at the median line, and that in the median surface the region of the second branchial duct offers the greatest chance for the rudimentary formation of dermoid cysts.

Although dermoid cysts in the floor of the mouth are rather rare pathological findings, and comparatively few cases have been reported, there still have probably been quite a number operated on whose histories have not been published. Undoubtedly they have often been mistaken for a ranula, and then, too, the symptoms produced by dermoid cysts naturally depend largely upon their size and the rate of growth. Directly after birth and in infancy, when the cyst has not developed, or, if so, only to a small degree, it gives rise to little or no trouble, and very often when they remain very small they are hardly ever noticed by the patient. It is only after the period of puberty is

reached that these cysts commence to develop in size, and it is then that they increase sufficiently in volume to cause a certain amount of inconvenience.

At the bottom of the buccal cavity the cyst, as it increases in circumference, frequently pushes the tongue upward and backward, so that it becomes pressed against the roof of the mouth, and, owing to this, all the functions of the mouth and tongue are rendered difficult. Speech becomes more and more indistinct, and when the cyst arrives at a certain size the articulation of words and mastication become practically impossible. Respiration may also be difficult, though no instance of complete obstruction to breathing has ever been recorded, although this might be quite possible if the growth pressed sufficiently on the larynx, or if it closed up the posterior pharynx by pushing the tongue sufficiently backward. These dermoid cysts never give rise to pain, and their prognosis is naturally favorable, because a radical operation can be performed with a perfect result.

The pathology of other cystic neoplasms which are occasionally met with in the mouth, more especially those which develop from the superficial mucous glands of the mucous membrane, I shall leave aside as not having any direct bearing on the subject of this paper, because these productions never attain any size, and their prognosis is perfectly simple.

From the differential diagnostic point of view we have, however, a pathological process which has for its site of development the under aspect of the tongue and floor of the mouth, and which presents almost identically the same clinical symptoms as dermoid cysts, or at any rate in many instances they simulate the symptoms of dermoids very closely. The cystic tumor to which I refer is ranula, and I will devote a few words here to its pathology, not only because it has given rise to a great deal of confusion, but also, and more especially, because up to the present time the true character of this disease has not been clearly defined, and many tumors of the tongue have been given this name, which really did not belong to them.

The first attempt to explain the cause of ranula was made by Diemerbrock, who considered this affection as a cystic production due to the retention of saliva in the duct of Wharton. According to this authority, the retention is produced by stenosis of the duct or by its complete occlusion. Soon afterward the ducts of Bartholini and Rivini were also considered the starting-points of ranula, so much so that even Dupuytren believed that the small mucous glands situated in the bottom of the mouth could give rise to the formation of this affection if retention of their secretions occurred. Fleischmann believed that ranula was a hygroma of a certain mucous follicle which he discovered in the mucous membrane of the bottom of the mouth, and is to be found

on the anterior border of the genioglossus muscle. But all these theories have been proven to be untenable; Fleischmann's follicle is not constantly present, and the small retention cysts occurring in the mucous glands of the mucous membrane lining the bottom of the mouth never attain the size that ranula does; and, still more, they do not lie beneath the mucosa, but are embedded in it. As to Diemerbrock's theory, it may be refuted from the fact that Wharton's duct is found in a perfectly normal condition when ranula exists.

Other attempts to explain the pathology of ranula were made by Neumann and von Recklinghausen, but this time with the aid of the microscope. Since Neumann was able to demonstrate the presence of ciliated epithelium in the anterior of the cyst he believed that ranula might originate in the gland tubules of Bochdaleck, for the simple reason that they are lined with a ciliated epithelium. Von Recklinghausen, on the other hand, considered that ranula arose from the main ducts of Blandin-Nuhn's gland, which is situated at the tip of the tongue. This theory was considered as the only correct one for some years, until Hippel's paper was published a year or two ago, dealing with the structure and pathogenesis of ranula, and it may be said that this essay has pretty thoroughly cleared up the question regarding the mode of origin of this neoplastic cystic formation.

Hippel considers ranula as a retention cyst of the sublingual gland, and, in some rare cases, of the glandula incisiva. The causative factor is to be found in a chronic interstitial inflammation of the ducts which occludes the smaller tributary ducts. From the commencement the cystic formation arises from the continued glandular secretion, whose emunctories are occluded, and later on by a proliferation, degeneration, and desquamation of the epithelium lining of the ducts as well as a transudation occurring from the new-formed capillary vessels. As a secondary effect the occluded portions of the glandular tissue undergo a pressure atrophy and disappear.

Now, according to this mode of origin, the wall of ranula shows no epithelial structures whatever. It is simply a thin sac composed of connective tissue, embedded in which are found atrophied glandular lobes here and there, which are oftentimes difficult to recognize as such. Externally the walls of this cystic production are connected with the sublingual gland at its lower and posterior aspect, and after a while the process may extend somewhat to the front and toward the upper part of the gland. The ranula gradually extends over into the intra-acinous connective tissue of the sublingual gland. On the anterior aspect, however, it comes directly into contact with the submucous strata of the mucous membrane of the mouth, and at this point the cyst is much thinner than at other places, which is due to the quantity of the contents present in the cyst and to the degree of distention of

its walls. The contents of ranula are composed of saliva secreted from the gland, which is mixed with blood-serum transudated from the numerous new-formed capillaries of the cyst wall. Microscopically we find small epithelial masses which represent the last remnants of the epithelium structures.

The position of ranula is naturally not always the same, and varies according to the position of the sublingual gland as well as the site of the glandular lobe which is the seat of chronic interstitial inflammation. Generally speaking, the cystic production is seated beside the frænum of the tongue, and then as it increases in size it extends outwardly and inwardly, so that it appears to have an almost median position. In other cases a glandular lobe that is situated rather laterally may have been affected, so that the cyst is also situated to one side and does not reach the median line. It is rather unusual to find a case of ranula where the cyst is in the median line near the dental arcade, and, according to Hippel, when this does occur the affection has originated in the glandula incisiva, which histologically has the same structure as the sublingual gland, and consequently the former may be the seat of the same pathological process as the latter. The development of these cysts is, as a rule, not very considerable, and only in rare instances do we ever find a case of ranula that has developed to any great size. The submental type of ranula will produce a pressure on the soft parts composing the floor of the mouth, in order to find space enough to develop.

The commencement of dermoid cysts in most instances passes by unnoticed by the patient, but in a large number of cases the presence of the cyst was noted at birth or shortly after; but at this early period the tumor is usually only discovered accidentally. In a few cases its size was large, considering the age of the child, and was a hinderance to nursing—a fact which drew their attention to the condition present.

In adolescence and adults the growth, which had been discovered and been known to exist for a varying length of time, has been estimated at a size varying from a walnut to an apple. In one instance it attained the size of the fist. The growth may project both into the mouth and from under the chin in some cases, but there are some reported where these growths project simply under the chin and showed no prominence in the floor of the mouth. In other cases where the tumor only develops upward under the mucous membrane of the mouth—and this is by far the most frequent condition—no projection can be noticed in the suprahyoid region.

In those cases where the cyst is sufficiently large to fill the buccal cavity more or less completely, the tumefaction that it produces in the suprahyoid region may become accentuated or make its appearance if it were absent in the beginning. The growth projecting into the mouth

pushes the floor of the cavity toward the suprahyoid region. The cyst situated in the floor of the mouth is more or less near to the lower jaw, whose concavity it occupies and fills. In some instances it lies directly against the posterior surface of the symphysis and pushes up the frænum of the tongue, while in other cases it recedes from the jawbone, and by examination a sort of transversal furrow will be found separating it from the bone. In other instances the cyst may develop in the tongue itself, which gives the organ the appearance of being filled with liquid, as the new-formation usually involves the entire thickness of the organ and extending backward nearly to its base.

In all cases the cyst is located in the median line, and the frænum of the tongue, which is more or less tense, divides the cyst into two symmetrical parts. The integuments which cover the cyst, whether skin or mucous membrane, are healthy in appearance and preserve their natural color. The mucosa in particular has a rosy color, and only in a few exceptional cases has it been known to take on a grayish hue, and this only occurred in mucoid cysts—a fact which can be easily understood. In a few cases the exterior aspect had a yellow color, which was due to the transparency of the mucous membrane and the walls of the cyst, which by transmitted light gave the yellow tint of the fluid contents to the coverings of the tumor. But in most cases the mucosa is opaque, and what is the most essential point to be remembered in the diagnosis is that in no case has the bluish color of the mucous membrane been met with, which is so characteristic in the greater number of cases of ranula. Wharton's ducts always remain patent, although they are sometimes deviated from their normal course, but saliva will always be seen flowing from their orifices.

By palpation the mucous membrane of the mouth will be found smooth and even, and the same may be said of the skin, which can be moved easily over the underlying organs. This condition is what should be expected, since the very loose cellular tissue forms a complete sheath for the cyst, and if inflammation has not taken place within the growth no adhesions will exist between it and the fat. Palpation will also show that the limits of the cyst are more or less distinctly circumscribed, and it has an oval shape, without any elevations or irregularities in its contour. Intracystic tension may be marked, but extracystic tension is in most instances only slightly pronounced. The cysts may be elastic, but in a large majority of cases the growth was soft, sometimes simply renitent, but usually fluctuation could be elicited.

To demonstrate the presence of fluctuation bimanual palpation is perhaps the best way of proceeding so that the pressure may be transmitted from one projection to the other. A symptom which has been described by Linhart is that when pressure is made on the culminating

point of the cyst its sides expand not rapidly, as in cases of liquid tumors having a distinct fluctuation, but with a certain tardiness. The swelling at the sides of the cyst will disappear as soon as the pressure has been removed.

Puncture of the cyst with an exploring needle may be useful in ascertaining the nature of the contents of the growth, but I would limit the practice to doubtful cases, although in several instances it was done where the surgeon thought he was dealing with a case of ranula, and was thus able to rectify his diagnosis. With the exception of mucoid cysts, whose liquid contents might flow off, although with difficulty, nothing will come away through the exploring needle if the growth is a dermoid, but the needle when withdrawn may contain particles of caseous matter. There is, however, no reason why a certain amount of fluid should not be present in these cysts, just as there is occasionally found in dermoids of the ovary, and in one case reported by Caye some liquid was present. The dermoid cysts of the mouth develop without pain, and this is perhaps why in most cases their exact beginning is unknown, and although they may have been present for some years they are not recognized by the patient until late in life.

A dermoid will develop in the direction of the least resistance, and when it grows toward the suprahyoid region the patient will not be much hindered by its presence; but it is not the same when the growth projects up under the tongue. If the cyst is large it may produce a difficulty in the articulation of words or an alteration in the tone of the voice. This symptom is frequent, but it is common to all intrabuccal growths, and particularly to ranula.

As the tongue is pushed upward and backward, deglutition is sometimes embarrassed, while mastication is often difficult on account of the obliteration of the buccal cavity by the growth. Even when this may have arrived at an extreme degree respiration does not appear to be interfered with excepting when the patient makes an effort.

Deformities of the skeleton have been noted in a few cases. In one the alveolar border was projected forward almost horizontally, so that the lower incisives were very prominent. In another case the lower incisives and canines were pushed forward obliquely. The lower jaw was likewise projecting. I would say, however, that in these rare instances the cysts had reached a very large size and had an exclusively intrabuccal development.

In no case have I been able to find that the cystic production opened spontaneously, as is the case in dermoid cysts in other regions; but there is no reason why this should not occur in the cysts under consideration. Incomplete operations, such as puncture or incision and drainage of the cyst, have always been followed by a recurrence of the growth, and usually have increased the difficulties of a radical opera-

tion, as these interventions have generally given rise to inflammation resulting from septic infection of the cyst.

The prognosis of dermoid cysts of the floor of the mouth is quite serious, inasmuch as in the newly born it prevents nourishment being taken; in the adult the relative gravity of these cysts lies in the fact that they have no tendency to retrocede.

The tumor increases in size, and may, if allowed to continue, become so voluminous that movements of the tongue become impossible. On the other hand, it may become spontaneously infected and give rise to a severe inflammatory process, as occurs in dermoid cysts of the ovary; and this may also arise, as I have already said, after an incomplete surgical operation for its relief. In these cases also an incomplete operation may result in the formation of a sinus, which will not close until complete extirpation of the growth has been done; but when complete extirpation has been performed the patients promptly get well, and all the disturbances in mastication, deglutition, and phonation soon disappear.

The diagnosis is most important on account of the treatment, and there are cases which offer no difficulty. If, for example, we are dealing with a congenital tumor situated exactly in the median line—indolent, with a slow development, without inflammatory symptoms, having a special pasty fluctuation, the mucous surface being opaque or of a whitish or yellowish color—and if at the same time Wharton's ducts are patent, there is no occasion to hesitate, and an exploratory puncture will be quite superfluous.

But in most instances these cysts do not present themselves with all these signs, and occasionally it is only by eliminating each one of those tumors which may occur in this region that a diagnosis can be surely arrived at; and what proves the difficulty of the diagnosis is the relatively large number of mistakes that have been committed and have only been rectified after an exploratory puncture or during the operation.

Among those tumors which might be mistaken for a dermoid cyst I would only mention tubercular abscess and solid neoplasms which have undergone an ulcerative process, because the mistake that is most likely to occur is confounding a ranula with a dermoid cyst, and *vice versa*. Since dermoid cysts are congenital formations in those cases where the presence of the growth has been noted early in the patient's life, the possibility of ranula will at once be excluded.

Now in a case of ranula the condition of affairs is entirely different; they may develop at any time and at any age, provided a chronic inflammatory process develops in a small duct of the sublingual gland; and this can bring about a cystic formation in a much shorter time than a dermoid would need for its development. It is not at all

unusual for a patient to say that the tumor developed in from one to two weeks, and that the large cystic growth present commenced as a small elevation under the tongue. Those cases of dermoid where the commencement of the growth does not begin in infancy or during puberty are very rare indeed. They may possibly be explained by assuming that the epithelial germs which did not disappear during fœtal life, for some reason or other later on began to develop; but even then it is probable that a very small tumor had existed under the tongue, but had not been observed by the patient until it began to increase in size and caused some trouble.

Patients will also occasionally say that a small tumor situated under the tongue has burst on one or more occasions on account of some injury inflicted, and that after having discharged its contents had again reached its original size, and this speaks rather more in favor of the diagnosis of ranula than of dermoid. The thick walls of a dermoid cyst offer much more resistance to external violence, but when circumstances are very unfavorable it may happen that the walls become lacerated, and then the dermoid will discharge its contents; but in this case, on account of the slowness of the secretive process, the sac of the cyst is refilled after a much longer time than would be the case in ranula. Other distinctive features between ranula and dermoid cyst may be had by inspection, and, as may be seen by the drawing illustrating my case reported in this paper, the surface of the dermoid growth is smooth; they are rounded tumors which extend out across the floor of the mouth and pretty well fill up the bottom of the buccal cavity, and push out the mucous membrane overlying them in a very uniform manner. The growth reaches equally outward on both sides of the median line and uniformly presses on the submental region. The mucous membrane covering the growth, being elastic, has become stretched with ease, due to the slow growth of the tumor, and no tension or pathological change can be observed. The mucous membrane has retained its normal thickness and color, although the tumor walls considerably differ in hue from the surrounding structures on account of their whitish color.

The aspect of ranula is quite different. Owing to the above-mentioned reasons, excepting those rare instances where the cystic formation originates in the glandula incisiva, the tumor is never found in the median line, but is always situated more or less to one side; in its first stage of development, at the lower border of the free part of the tongue beside the frænum. Ranula causes the mucosa to project, but as it increases in size it does not retain its original rounded shape, but yields on account of the thinness of the cyst walls and of the liquid contents which exercise pressure on it, more especially by the tongue, so that in the end it takes on a rather elongated shape, one end

of which appears usually as a rounded projection under the mandibula on the side of the throat; but what is most characteristic of ranula is its bluish color, which is due to the transparency of the clear liquid contents of the cyst through the thin layer of connective tissue and the red mucosa lining the floor of the mouth; the latter, on account of the rapid growth of the cyst, becomes stretched, although to a limited degree, but has, nevertheless, become somewhat thinner.

Lastly, there is a difference in these two types of cysts which is made evident by palpation. Although the surface of both is smooth to the touch, and the mucous membrane is freely movable over the growth, and although both these cystic productions are distinctly limited from the surrounding tissues, it will be found that if with two fingers we try to define the presence of fluctuation this symptom can be obtained distinctly in cases of ranula, except, perhaps, in those instances where the cyst is less plainly defined, owing to its large size and very tense walls, while dermoid cysts will show pitting left on its surface by the exploring finger in many cases, which demonstrates the putty-like consistency of the contents of the cyst. If, however, the contents have become partially liquefied, an occurrence which may take place occasionally when the dermoid is of long standing or a very large one, we are naturally liable to get a sensation of fluctuation. In doubtful cases an exploratory puncture will immediately inform us of the consistency and quality of the contents, and the diagnosis is made. If it is a cheesy, lumpy mass, or in those instances where liquefaction has taken place, when it is a thick, oily, brown fluid, we have a dermoid cyst, while in cases of ranula the contents are a thin, clear, light-colored liquid; but, for surgical reasons, puncture should never be resorted to if it is possible to avoid it.

The sanguineous ranula of Dolbeau, or, in other words, erectile tumors of the floor of the mouth, have, in common with dermoids, only their slow progress and congenital origin. They are violet in color, they are reducible, and they do not change in size during the cries of the child.

To finish with the fluid tumors of the floor of the mouth, I would mention hydatid cysts, which have twice been met with in this region, in which case the diagnosis could hardly be made otherwise than by an exploratory puncture if the cyst is situated in the median line.

Lipoma of the floor of the mouth have a few symptoms in common with dermoids, among others a false fluctuation. These neoplasms are extremely rare; they are not congenital; their progress is slow and progressive; they often project into the suprahyoid region; they are more or less irregular in shape; their thin encapsulating membrane occasionally gives rise to the yellowish color by transparency. By palpation they have a peculiar feeling, devoid of that soft, pasty, and often fluctuating consistency of dermoids.

As to the treatment of dermoid cysts of the floor of the mouth, it may be said that it is a simple surgical procedure. Not long ago these productions were treated by simple puncture followed by the evacuation of the contents; but it is evident that no permanent result could be obtained in this way, for the walls of the cysts will continue to secrete, and after the little wound left by the needle has closed up the contents would again collect. At the present time the only proper treatment is extirpation of the cyst.

The buccal route was preferred for a long time, because it appeared a more simple matter to operate in the mouth, as the growth projected under the tongue, and consequently was more directly reached. Besides this, a cutaneous cicatrix was avoided, and still more, the extirpation of the cyst through the mouth was never followed by any serious symptoms. At the present time the consensus of opinion is that these growths are better removed through an incision in the submental region. The soft parts are separated by blunt dissection, and it may be necessary to divide the platysma and the mylohyoideus muscles. The entire cyst can be removed with greater facility if care is taken not to puncture it, and thus allow it to discharge its contents, because the walls will then collapse, and dissection will be rendered far more difficult. After the cyst has been removed the resulting cavity had better be packed with wicking and drained for a few days. I believe that removal of these cysts through the mouth, by making an incision directly through the mucous membrane should only exceptionally be employed, because very unfavorable conditions for the wound are naturally present. Retention of the secretions may occur because the field of operation is limited, and dissection of the cyst by way of the buccal cavity is often very difficult, and quite frequently the contents must be allowed to escape, at least partially, in order to effect its removal.

I will now in a few words outline the technique of the operation. An incision is made in the median line, extending over the entire convexity of the growth from the lower border of the jaw to the os hyoid. The geniohyoid muscles are exposed, and the muscular mass composed by the mylohyoideus muscles are separated with a Kocher dissector and held aside by retractors; the cyst is then exposed to view, and with the finger the adhesions binding it to the surrounding structures are broken down, care being taken to free the growth from the adhesions binding it to the os hyoid or the genian apophyses.

If by any chance the contents of the cyst should escape during the operation, the wound should be carefully cleansed before the sutures are inserted, because occasionally the contents are septic and might infect the wound.

CASE I. (Cumston.)—Male, aged twenty-one years, was referred to me in October, 1900, for a large tumor situated in the floor of the

mouth. The patient said that the growth had been present since the age of seven years. It was then a small, painless tumor situated in the floor of the mouth, in the median line. For the last three years the tumor has been growing until it has reached its present size, which is that of a large lemon. (See illustration.)

By examination the growth was found to be oval in shape and reached above the level of the lower teeth. The tongue was thrown upward and backward, but it could be pushed out of the mouth a little. The posterior limits of the growth were difficult to make out on account of its size, but it certainly extended backward to the angle of the lower jaw. It did not project in the submental region, but by palpation here it could be felt. The buccal mucous membrane was perfectly normal

CASE I. Dermoid cyst of the floor of the mouth. (Dr. Cumston's case.)

in color and moved freely over the surface of the growth. Both Wharton's ducts could be seen giving issue to saliva when they were stimulated.

By palpation the tumor gave rise to the sensation of a doughy fluctuation, as if the cavity might contain a thick, oily substance, but no pain could be elicited.

Speech was very difficult for the patient and deglutition was becoming so, and it was particularly for this latter symptom that the patient was advised to seek surgical aid. From the history of the case, and the data obtained from the patient and by examination, I had no hesitancy in making a diagnosis of a dermoid cyst of the floor of the mouth. Extirpation of the cyst was performed through an incision in the submental region.

Pathological examination of the growth after removal gave the following data: The cyst was situated in the submucous cellular tissue of the floor of the mouth, between the genioglossus muscles. The contents of the cyst were a grayish, pasty mass, which microscopically was found to contain cholesterin, hair, and elements which probably represented altered epithelial cells. Microscopical section of the cyst wall showed that the internal aspect of the cyst was lined by an epidermic layer in every way similar to the normal epidermic layer, with rows of horny cells, and under these a granular layer very distinctly visible, and finally the rete of Malpighi. The second layer was composed of a dermis in every way identical to that of the skin, excepting that perhaps the elastic tissue was a little more developed, and the papillæ were less distinct than in normal skin, appearing larger but less elevated. The hairs present had bulbs, and were surrounded by a distinct sheath with sebaceous glands. From these pathological findings we were evidently dealing with a perfectly typical dermoid cyst.

CASE II. (Caye.)—Female, aged sixteen years. Came to hospital for a tumor in the mouth which hindered the movements of the tongue. The growth had been present since infancy, had always been distinctly in the median line, and increased in size very slowly until about three years ago, since which time it has developed progressively. Examination showed a tumor situated exactly in the median line in the floor of the mouth under the tongue, extending a little more to the left than to the right. It was the size of a walnut and was perfectly smooth. The growth reached as high as the dental arch, but did not project into the submental region.

Mucous membrane of the buccal cavity normal. Palpation showed the tumor soft; when pressure was relaxed it took its primary shape. The presence of adhesions binding the growth to the deeper structures could not be ascertained; the orifices of Wharton's ducts were seen on the anterior aspect of the growth. Diagnosis, dermoid cyst of the floor of the mouth.

Extirpation of growth by the way of the buccal cavity. The growth did not adhere to the muscular tissue, being isolated from the surrounding structures by an enveloping capsule of loose cellular tissue. Anatomical diagnosis, dermoid cyst.

CASE III. (Rocha.)—Male, aged twenty-two years. For the last two years had noticed a tumor under his tongue which had slightly interfered with speech. As the growth was increasing in size, speech was becoming more difficult as well as the mastication of food. On inspection, the entire floor of the mouth was filled by a tumor which projected well up into the buccal cavity, pushing the tongue upward. The growth was situated in the median line. The surface of the tumor was smooth, and the mucous membrane covering it normal. The growth, on palpation, was found to be soft, but no distinct fluctuation could be elicited. Diagnosis of dermoid cyst of the floor of the mouth was made.

After puncture of the cyst through the mouth, which gave exit to a certain amount of caseous substance, an incision was made in the submental region transversely, about 10 cm. in length. After cutting through the platysma and mylohyoideus muscles the dermoid was laid free and was dissected out. The wound was plugged with gauze and sutured. Recovery uneventful.

CASE IV. (Rocha.)—Male, aged thirty-eight years. Ever since childhood he had noticed the presence of a tumor under his tongue. In the beginning it was about the size of a cherry, but later it increased in size so that in the last twenty years it had grown to the volume of a walnut, and had then appeared to stop growing. The patient did not complain of any pain in the growth and it did not trouble him much to eat or speak. During the last two years the growth had reached the size of an apple.

Under the tongue the entire floor of the mouth was pushed up by a tumor, the mucous membrane of the buccal cavity covering it being perfectly normal. The growth did not appear to be connected with the tongue. The sublingual glands appeared to be somewhat atrophied. By palpation the tumor appeared to give rise to a pasty fluctuation, and when the finger was pressed upon its surface the imprint made remained for a few seconds and then disappeared. Diagnosis, dermoid cyst of the floor of the mouth.

The mucous membrane of the mouth was incised to the extent of about 6 cm. and, by blunt dissection, was freed from the surface of the tumor. During extirpation the walls of the cyst broke and gave issue to a certain amount of caseous matter containing hair. Gauze packing and drainage of the wound, with suture of the mucous membrane. Recovery uneventful.

CASE V. (Syme.)—Female, aged twenty-four years; presented a tumor in the floor of the mouth sufficiently large to completely hide the tongue, and projected in the submental region as well. It had been present since infancy, but had only begun to increase considerably in size in the last few months. An incision was made which exposed a cyst of a yellowish color, its contents being a grayish, caseous substance. The cyst was about the size of a large hen's egg.

CASE VI. (Linhart.)—Female, aged twenty-one years. Had noticed for the last two years a flattened tumor under the tongue, which in the beginning had not interfered with speech, but during the last six months had notably increased in size. The floor of the buccal cavity was depressed, and in the submental region a fluctuating distended tumor could be felt. By inspection the mucous membrane of the floor of the mouth was seen to be pushed up by a growth which occupied the entire floor of the mouth, and whose borders touched the teeth of the lower jaw. At the upper aspect of the growth the point of the tongue was hardly to be recognized, situated as it was in a sulcus, and consequently could not be projected forward. The mucous membrane covering the cyst was movable over the growth, and on the median line a fine white cord drawn over the middle of the cyst, and which represented the frænum, could be seen. The orifices of the ducts of the sublingual glands were found on the lower lateral part of the growth very near the floor of the mouth. Fluctuation was especially evident when bimanual palpation was practised. Deglutition was so difficult that the patient could swallow hardly any solid food.

A curved incision following the border of the lower jaw was made in the mucous membrane, and the flap thus formed was dissected off and raised toward the tongue. Another incision was made in the median line, care being taken to avoid the orifices of the salivary ducts which separated the flap of the mucous membrane into halves. On each side of the median line the genioglossal muscles could be seen, and

they were divided the entire extent of the wound. After a rather difficult dissection the cyst was freed, but on account of its size it was impossible to deliver it through the mouth; but, by puncture, a certain amount of caseous material was allowed to escape, which reduced the cyst sufficiently to allow of its easy delivery.

Case VII. (Linhart.)—Male, aged twenty-eight years; presented a rounded tumor on the floor of the mouth, the convex surface of which touched the roof of the mouth, preventing the jaws from coming completely in contact, and interfered with mastication and speech. The growth was covered by the buccal mucosa, under which the oblique course of the excretory ducts of the sublingual glands could be seen.

Digital pressure could flatten out the tumor, and produced depressions which only disappeared when movements of the tongue were made. The cyst was of a pasty consistency and painless. The exact situation in the median line, between two longitudinal projections formed by the border of the genioglossal muscles, settled the exact location of the growth.

A longitudinal incision in the median line was made in the mucosa, carefully avoiding the salivary ducts, and the tumor was enucleated. It was only slightly adherent, and was easily detached by the finger.

The cyst, after removal, was larger than a goose egg, its contents being composed of a thick white mass containing numerous short hairs. The patient was discharged, well, a week after the operation.

Case VIII. (Patel.)—Female, aged forty-nine years, with a tumor situated on the right side of the floor of the mouth. The growth was first noticed about eighteen months ago. It was about the size of an almond at that time, and, according to the patient's story, it had not increased in size since. There were no functional disturbances produced by the growth.

Examination showed on right side of the floor of the mouth an elongated tumor lying against the external aspect of the lower jaw and projecting slightly above it. The tongue was projected upward. The tumor occupied the position of the sublingual gland. Its inner limits stopped at the median line, while outwardly they were not distinct, and appeared to extend beyond the sublingual cavity. The mucosa covering the tumor was somewhat vascular and granular. The orifice of Wharton's duct was indistinctly seen.

By palpation the tumor was found to be soft; it could easily be reduced, and pulsation was absent. On the left side a small tumor having the same characters was noted. Both of these tumors, which were situated on each side of the median line, lie on a tumefaction which appears to occupy the entire floor of the buccal cavity. Fluctuation could be distinctly made out, but there was entire absence of pain. Examination of the median suprahyoid region showed an increase in size, but the patient says that it had always been there. By palpation a tumor, the size of a turkey's egg, was found, situated above the os hyoid, and apparently extending more to the right than to the left. The skin was movable over the surface of this growth, and the tumor did not move during the act of deglutition.

A median suprahyoid incision was made, and after going through the muscles the growth was exposed. It was then incised and gave exit to quite a large amount of semi-solid coffee-colored contents, composed of sebaceous material. The cyst was then dissected out with difficulty,

on account of the tough adhesions binding it down on the right side. Drainage. Cure.

CASE IX. (Delore.)—Male, aged forty-five years. Only about six or seven years ago he began to have a slight difficulty in speaking and eating. The mass continued to increase in size, so that after the lapse of two or three years the disturbances in deglutition and speech became very marked, and attacks of suffocation would occur during the night on account of the weight of the tumor forcing back the tongue.

The growth, which was about the size of a large orange, and covered by a smooth and normal mucosa, projected almost from the mouth. It was situated almost in the median line, and pushed the tongue against the roof of the mouth and slightly to the right. About two-thirds of the tumor was on the left, the other third on the right of the median line. The suprahyoid region was elongated, flatter than normal, and was pushed backward by the tumor.

Palpation revealed a peculiar softness, and distinct fluctuation could be elicited. Below, the tumor was in contact with the os hyoid and the posterior aspect of the lower jaw. It moved with the tongue and os hyoid, with which it was manifestly adherent. It did not appear to adhere to the jaw.

A puncture was made, and some semi-solid contents, reddish in color, oily in consistency, and containing cholesterin, were evacuated. The pocket of the cyst was then enucleated through an incision in the mucosa. The cyst was found very adherent to the os hyoid and apophysis geni. Complete extirpation was, however, accomplished after much difficulty. A drainage-tube around which gauze was packed was inserted into the cavity. Cure. Histological examination showed the cyst to be a dermoid.

CASE X. (Richet.)—A child a few days old was brought because for the last few days he would only take the breast with difficulty, and as time went on this appeared to be increasing. On examination the tongue was found pushed up by a tumor the size of a small walnut, situated in the floor of the buccal cavity, which it appeared to almost completely fill. Fluctuation was present, its surface was smooth, and extended from the front of the mouth backward.

A few weeks later, after other treatments had failed, excision of a portion of the walls of the cyst, with cauterization of its interior, was performed, and as the improvement was great the child was not again seen for two months. At the end of this time the patient was brought back, and a small, rounded projection could be felt in the floor of the mouth, but an operation having been refused, the child was lost sight of.

CASE XI. (Denonvilliers and Verneuil.)—Male, aged twenty-eight years, entered the hospital for a large tumor situated in the floor of the mouth. At about the age of six he began to notice a small indolent tumor, situated in the floor of the mouth below the tongue, in the median line. In the beginning the tumor was about the size of a walnut, and has little by little increased in size. For the last two years it has apparently remained stationary, and has never given rise to any pain.

Examination shows that the growth occupies the totality of the floor of the mouth. It is about the size of a small orange, globular, and rises considerably above the level of the teeth of the lower jaw. The

tongue is completely pushed up and backward, and is hidden by the tumor. Forward projection of the tongue is absolutely impossible. There is no projection in the suprahyoid region. The mucosa covering the tumor is normal and is perfectly movable over the surface of the growth. Wharton's ducts can be seen. Palpation shows fluctuation, and does not produce pain.

Puncture of the cyst gave issue to whitish-yellow sebaceous matter. A transversal incision was immediately made into the cyst, and by pressure a large quantity of this substance was expressed, amounting to about 100 drachms.

After various treatments, which were without result, an incision was made in the mucosa and the cyst enucleated. Extirpation was easy excepting at the lower part of the cyst, where the adhesions were so tough that they had to be cut with scissors.

Histological examination showed the growth to be a dermoid cyst.

CASE XII. (Cruveilhier.)—Male, aged sixty-two years. On examination of the sublingual region a rounded tumor occupying the median line was found. The growth was about the size of a small russet apple and pushed the tongue upward against the roof of the mouth. The tumor could not be felt in the suprahyoid region. Fluctuation was distinct. Transparency of the growth was absent. The patient died shortly afterward from bronchitis, and the examination at autopsy showed that the cyst was a dermoid.

CASE XIII. (Gallard.)—Female, aged twenty years, presented in the floor of the mouth below the tongue a tumor the size of a hen's egg. The patient was quite sure that she had not noticed it before the age of twelve years.

The tumor appeared thin, elastic, and by palpation gave rise to the sensation of false fluctuation, but by pressure with the finger the tumor kept its imprint for a few minutes. The growth appeared to interfere with phonation and deglutition, and pushed the tongue toward the roof of the mouth, and at the same time formed a slight projection in the suprahyoid region.

The cyst was punctured and gave issue to a white, sebaceous matter, and in order to avoid the cyst a strip of the walls was excised from the anterior wall, after which the contents were easily removed.

Histological examination by Prof. Cornil showed that the growth was a dermoid.

CASE XIV. (Bryant.)—Male, aged twenty-five years, was sent to the hospital with an inflamed tumor, situated under the tongue, which the patient had noticed for the first time about six years previously. A seton was inserted, but the tumor had never disappeared. It had never caused any trouble until six months ago, when it began to increase in size, so that it became troublesome. A surgeon opened the growth and gave exit to a hard matter, and the entire growth began to be inflamed from this time.

When Bryant saw the patient the latter could hardly speak, the tongue being pushed against the roof of the mouth by an inflamed tumor situated beneath it, and completely occupied the concavity of the lower jaw. On the left side was an opening through which a sound could be easily passed. By pressure a peculiar semi-solid, sebaceous mass with a fetid odor could be removed. The opening which already existed was increased in size, and about three ounces of the contents

were evacuated, after which the walls of the cyst became visible and were found smooth and inflamed.

The patient was ordered to frequently wash out the mouth with hot water, and when he returned some time later the condition of affairs was relatively good. The cyst finally became completely empty and the inflammation subsided.

CASE XV. (Bryant.)—Male, aged nineteen years, with a tumor situated underneath the tongue, in the median line, which was first noticed about six months ago. It had gradually increased in size, and latterly had become so large that the patient could hardly speak. The tongue was pushed toward the roof of the mouth by a large cyst, which projected equally on both sides of the frænum. Wharton's ducts could be seen passing over the growth.

The tumor was incised, its contents evacuated, and the cavity plugged with charpy. Inflammation took place, and an apparent cure was obtained.

CASE XVI. (Neumann.)—Male, aged fifty-two years, had had since birth a growth which had only taken on a notable increase in size during the last few years, and finally had obtained such a volume that the tongue was pushed back toward the pharynx, producing great disturbances in deglutition and speech.

By inspection of the mouth the tongue could no longer be seen, and in its place there was found a fluctuating tumor projecting out of the mouth. A small piece of the anterior wall of the growth was excised, and microscopically a dermoid cyst was diagnosed.

CASE XVII. (Verneuil.)—Female, aged eighteen years. The time at which the cyst first made its appearance was uncertain, but it certainly had been noticed three years before the operation. The cyst was the size of a hen's egg, indolent, non-transparent. It did not disturb either speech or mastication, and it projected in the suprahyoid region.

Puncture gave issue to about 30 grammes of a grayish, thick liquid. Examination of the buccal cavity showed that the cyst was situated under the tongue, in the median line. It was partly enucleated with the finger through an incision in the median line of the floor of the mouth, but it was quite adherent to the anterior aspect of the os hyoid.

Histologically the growth was a dermoid cyst.

CASE XVIII. (Meunier.)—Male, aged fifty-two years. Examination showed a large cyst occupying the floor of the mouth, but at no time had the growth given rise to any trouble in speech or deglutition.

At the operation the cyst was found to occupy the median line, immediately behind the lower jaw, below the tongue, above the mylohyoid muscle, between the genioglossal muscles, which could be seen sliding over the sides of the growth. The tongue was movable in every direction, was pushed up over the level of the teeth, and when it was pushed backward it caused the tumor to project upward and forward, producing a projection under the chin when the tongue was carried forward. The mucosa was movable over the growth. The tumor was about the size of a large mandarin orange; it was smooth, soft, rounded, fluctuating, and painless. Wharton's ducts could be seen, and maintained their normal relation to the tongue.

The cyst was removed by a longitudinal incision of the mucous membrane.

A careful histological examination showed the growth to be a typical dermoid production.

CASE XIX. (Nicaise.)—Female, aged three years. Presented a dermoid cyst, situated on the under surface of the point of the tongue and somewhat to the left of the median line. It was about the size of a walnut. The growth hindered the movements of the tongue.

An incision was made on the under aspect of the tongue, and the cyst was dissected out. The growth was found to be connected to the median raphe of the organ by a very resistant hard cord, which was inserted perpendicularly to the posterior aspect of the lower jaw in the median line. This fibrous cord was also dissected out, and was found after removal to have a fibrous consistency, while its axis contained a narrow canal whose walls were very similar to the skin.

CASE XX. (Combalat.)—Male, aged thirty-five years. Had had as long as he could remember a tumor the size of a cherry in the floor of the mouth, situated in the median line. From the age of six years the patient had noticed a very slow though steady increase in the size of the growth, but it was only latterly that mastication and speech had been difficult. Examination showed that the growth occupied the floor of the mouth and completely filled the concavity of the lower jaw. It extended back as far as the last molar teeth. When examined with the mouth closed a small tumefaction was noticed in the suprahyoid region. With the mouth open the end of the tongue was pushed back and upward, so that it came in contact with the roof of the mouth. The mucosa covering the growth was pale, dry, and looked like parchment. By palpation the tumor was soft and pasty to the feel, while an indistinct fluctuation could be made out. The orifices of Wharton's ducts could be seen.

Extirpation was performed by an incision through the mucous membrane. Microscopically the growth proved to be a typical dermoid cyst.

CASE XXI. (Bazy.)—Male, aged thirty-one years. Had noticed a tumor in the suprahyoid region which had developed during the last year. On examination a growth the size of a small egg was found, being about six centimetres long in its longest diameter and from three to four centimetres in its transversal diameter. It was oval in shape and flattened antero-posteriorly. It appeared to be bound down to the suprahyoid region, and extended as far as the os hyoid, to which it was adherent, while its upper extremity was less adherent to the surrounding tissue. The skin was not adherent to the tumor. The growth projected above the floor of the mouth, and by palpation its surface was found smooth and rounded, without any adhesions to the mucous membrane. All functional signs were absent. The diagnosis was dermoid cyst of the suprahyoid region.

A vertical incision in the median line was made, extending from the lower jaw to within three centimetres above the os hyoid. The growth was easily dissected out, and only adhered to the os hyoid. Its dissection at this point was difficult.

Histologically the growth was a dermoid cyst.

CASE XXII. (Bazy.)—Male, aged nineteen years. Had noticed for the first time eight months previously a small tumor in the region of the os hyoid. It was painless and rolled under the skin. The growth had developed slowly, and in eight months had acquired the size of a walnut. Its surface was regular, it was situated in the median line,

while its consistency was somewhat firm and gave a sensation as if the walls of the growth were distended by soft contents. The skin was movable over the growth, and appeared normal. The tumor was adherent to the deeper structures, particularly to the os hyoid. It did not form any appreciable projection into the inside of the mouth.

An incision was made in the median line from the jaw to the thyroid cartilage. The growth was dissected out with difficulty, on account of numerous adhesions to the muscles and to the os hyoid. Suture. No drainage. Excellent recovery.

CASE XXIII. (Gerard-Marchant.)—Female, aged nineteen years. Had had for many years a tumor the size of a pigeon's egg in the median line, just above the os hyoid. The growth adhered so intimately to the latter that it was impossible to insert the finger between it and the cyst.

The growth was removed by a suprahyoid incision, and was found so adherent to the os hyoid that it was necessary to draw the latter out of the incision in order to accomplish this end.

The walls of the cyst contained air, and histological examination showed that it was undoubtedly a dermoid cyst.

CASE XXIV. (Duplay.)—Female, aged seventeen years. Had noticed for the first time a few months previously a tumor in the mouth which hindered the movements of the tongue. No pain had preceded the development of this growth. It was about the size of a hen's egg, and pushed up the floor of the mouth from the lower jaw to the insertion of the tongue. It was situated exactly in the median line. The mucosa covering it was normal, and perfectly movable. The growth projected downward between the muscles and formed an elevation in the suprahyoid region. It was very movable, and in no way connected with the os hyoid or the jaw. Fluctuation could be elicited. Operation showed the growth to be a dermoid cyst.

CASE XXV. (Lediard.)—The cyst was removed from the tongue of a child, aged six years; it had been present since birth, but had only lately increased in size, so that the lips could only with difficulty be brought over the tongue. The mouth was kept open and the end of the tongue projected between the lips. Speech was very indistinct, and some of the incisor teeth had fallen out on account of pressure. The alveolar borders of the lower jaw were pushed forward for the same reason, and the frænum of the tongue was ulcerated. The cyst occupied the centre of the tongue and extended backward into the neighborhood of the os hyoid. It was easily enucleated, and the child rapidly got well.

Microscopical examination showed that the contents consisted of mucous corpuscles, crystals of phosphates, and cholesterin. The growth was a dermoid cyst.

CASE XXVI. (Schmit.)—A young man noticed the presence of a tumor under the tongue. There was no pain and no disturbances of speech or swallowing. With the mouth closed a rounded tumor was seen in the median line, in the suprahyoid region, extending slightly over to the left. The skin covering the growth was normal. With the mouth open and the tongue raised up the growth was found to disappear from the suprahyoid region and projected under the tongue. The mucous membrane covering it was normal and did not adhere to the growth.

The growth was removed through an incision in the mucous membrane, and did not adhere either to the os hyoid or the lower jaw.

CASE XXVII. (Lannelongue.)—Male, aged ten years. Presented a tumor in the median line, in the suprahyoid region, which extended over to the right. The growth was about the size of a small mandarin orange, and raised up the cervical region behind the chin. It was perfectly regular in shape, and was situated under the aponeurosis, without any adhesion to the skin. It appeared to be adherent to the os hyoid. Fluctuation was difficult to elicit.

A median vertical incision was made, and it was necessary to incise the muscular layer in order to expose the growth. It was easily dissected out, as it was nowhere adherent.

Histologically the walls of the cyst were covered with epidermis, but no air glands or papillæ were discovered.

CASE XXVIII. (Guinard.)—Male, aged seventeen. Had noticed two years ago for the first time a tumor the size of a small walnut in the suprahyoid region. In a few months it had increased so in size that it projected up in the floor of the mouth. When seen the growth had attained the size of an egg and pushed the tongue upward and backward. It was situated in the median line, and appeared to be bound to the symphysis of the lower jaw. The mucous membrane covering the growth was normal and did not adhere to it. Wharton's ducts were normal. Palpation showed that the tumor was manifestly fluctuating, with a round, smooth surface.

The growth was removed through a transversal incision of the mucous membrane, and was found to be solidly adherent to the apophyses geni and to the intergeniohyoid raphe. It was removed with difficulty.

Microscopically the growth proved to be a dermoid cyst.

CASE XXIX. (Barker.)—Female, aged twenty-eight years. Had difficulty in swallowing for six years. Two months before coming under observation she noticed a tumor, which had increased in size steadily. It was situated in the median line, behind the symphysis of the jaw, and pushed the mucosa forward so that there was a space between the dorsum of the tongue and the lower part. It also projected under the jaw. The skin covering the growth was normal and did not adhere to it. The tongue was pushed up toward the roof of the mouth, and from this great difficulty in speech resulted. The mucosa covering the growth was thin, and large veins were scattered through it. The growth was fluctuating and indolent.

An incision was made in the median line from the symphysis of the jaw to the extent of about two and a half inches, and included the skin and raphe of the mylohyoid muscles. It was easily enucleated without opening into it, but was found solidly adherent to the os hyoid. Microscopically the growth was a dermoid cyst.

CASE XXX. (Barker.)—The author has seen another case similar to the preceding one, which was also situated between the genioglossal and the hypoglossal muscles. It was not quite so large as the preceding case, and was easily removed through an incision in the mucous membrane.

CASE XXXI. (Lannelongue.)—Male child, aged one year. Presented a tumor of the tongue seated in the under aspect of the organ, and occupied the two posterior thirds of this surface. The frænum was pushed to the right from the development of the growth. The

tumor was whitish-gray in color, and a few small vessels were seen on its surface. It was ascertained that the child was born with the growth, which at the time of birth was about the size of a pea and was seated more to the left than to the right. It had never interfered with nursing.

The growth was easily enucleated.

Histological examination of the cyst showed it to be a dermoid structure.

CASE XXXII. (Dardignac.)—In this case the growth was congenital in origin, and had rapidly increased in size when the subject was about twenty years of age. It was located exactly in the median line, and had contracted intimate adhesions with the periosteum of the lower jaw at the level of the apophyses geni. It was soft in consistency and absolutely indolent.

The growth was easily enucleated excepting at the point of its implantation, where it contracted the adhesions already spoken of.

Histologically it was a dermoid cyst.

CASE XXXIII. (Hofmokl.)—Female, aged twenty-eight years. During the last six months she had noticed a small movable tumor in the suprahyoid region. The growth was indolent and produced no functional disturbances. The tumor increased slowly in size, and finally projected into the mouth and underneath the tongue, and then interfered with mastication and speech. Examination with the mouth closed showed that the respiration was normal, and in the median line of the throat, just above the os hyoid, a tumor the size of a hen's egg was seen. The skin was perfectly normal, and by palpation the growth was found soft and very elastic.

Inspection of the interior of the mouth showed a tumor underneath the tongue, covered by a normal mucosa, and extending equally out on each side of the frænum. By pressing on the suprahyoid tumor the intrabuccal growth became more accentuated and tense. Fluctuation could be made out. Wharton's canals were intact.

The growth was opened through an incision in the mucous membrane, and after the sebaceous contents had been evacuated the cyst was easily enucleated excepting at a point where it was adherent to the jawbone.

Histological examination showed the growth to be a dermoid structure.

CASE XXXIV. (Gross.)—A young woman consulted the author for a tumor which had developed in the median line, in the suprahyoid region, the development of which had begun in early infancy. The growth had progressively increased in size, but had never given rise to pain or other symptoms. Examination showed a tumor projecting in the median line of the throat, just above the os hyoid. It was rounded in shape and about the size of a small apple. By palpation it was perfectly movable, and no adhesions with the surrounding structures could be made out. It was elastic, but did not fluctuate and did not project up in the floor of the mouth.

The growth was enucleated through an incision in the submental region. During the operation the cyst broke, which rendered its extirpation somewhat difficult.

Histologically the growth was a dermoid cyst.

CASE XXXV. (Gosselin.)—Female, aged twenty-one years. Shortly after birth there was noticed a small tumor under the tongue. For

fifteen years the growth remained about the size of a horse-chestnut, but for the last five years it had gradually increased, without causing pain or any change in speech.

On examination a growth the size of a hen's egg was seen situated in the median line, underneath the tongue. Its projection into the mouth was more noticeable in the left, and pushed the tongue slightly backward. The mucous membrane of the mouth did not appear to be thickened, and presented a grayish hue, with rosy areas. The growth was smooth, rounded, and soft, but was not pasty to the feel, and almost gave rise to the sense of fluctuation. No finger-print remained when pressure was made.

Curved incision of the mucous membrane, which was dissected off the anterior aspect of the cyst, which was easily enucleated excepting at the lower part, where the growth had contracted solid adhesions of a fibrous nature.

A careful histological examination showed that the growth was a dermoid cyst.

CASE XXXVI. (Reclus.)—Male, aged thirty-one years. Had noticed, three years previously, a rounded, movable tumor, the size of a walnut, which had commenced to push the tongue upward. It had increased slowly without producing any pain or functional disturbances. In a year's time it was the size of an egg, and in two years about the size of an orange. At the end of three years it had reached the size of an adult fist. It projected both under the floor of the mouth and in the suprahyoid region.

The surface was smooth and regularly rounded, and was situated under the muscles and skin, which was movable over the growth, and normal. The tumor projected markedly behind the dental arch, pushing back the tongue against the roof of the mouth. The mucous membrane was in a hyperæmic condition and thickened, but did not adhere to the growth. Fluctuation was evident, respiration easy, deglutition somewhat interfered with, mastication was possible, and the voice had only undergone a slight change in tone.

An incision was made in the suprahyoid region, in the median line, over the most prominent point of the growth. This was punctured and gave issue to 400 drachms of sebaceous material characteristic of the contents of a dermoid cyst. The opening thus made soon closed and the cyst began to distend again.

Three months after the latter operation the growth suddenly took on a rapid increase in size, accompanied by a sharp pain and an inflammatory reaction, so that the mouth was completely obliterated and the patient could not even swallow liquids.

When we saw the patient, two days later, the condition was alarming, although the respiratory functions were practically intact; but the man could only be nourished through a stomach-tube passed by the nose. The cyst appeared larger than when first seen, so much so that it filled the mouth and the patient could not close the jaw.

As extirpation was urgent, it was immediately done.

A careful histological examination showed the growth to be a dermoid cyst.

CASE XXXVII. (Reclus.)—Male, aged twenty-five years. Had always noticed that his throat was a little large at its upper part. The suprahyoid region was tense and slightly prominent. Little by

little the tumefaction increased, and when the patient was seen a rounded tumor in the suprahyoid region was found. The growth was limited by the concavity of the lower jaw and by the os hyoid. When the patient opened his mouth the tongue was seen pushed up and pressed against the roof of the mouth. Pressure made on the growth within the mouth caused the growth to bulge in the suprahyoid region.

Enucleation was easy excepting in the region of the os hyoid, to the posterior aspect of which it was adherent.

Histologically the growth was a dermoid cyst.

CASE XXXVIII. (Sutton.)—Male, aged twenty-four years. Presented himself with a tumor occupying the floor of the mouth and situated in the median line. During the lapse of nine years he had undergone seven operations, because the cyst had been wrongly diagnosed as ranula.

The cyst was dissected out, but was so intimately connected with the os hyoid that a periosteal elevator was necessary to peel it off.

Histological examination of the cyst showed that it was a dermoid structure.

CASE XXXIX. (Ferron.)—A young soldier complained of difficulty in breathing, which had been present for several years. During the examination of the nose and throat the tongue was found to be pushed against the roof of the mouth by a tumor the size of an egg, occupying the floor of the mouth and projecting more in the left. The growth did not make any appreciable projection in the suprahyoid region. It was regular in form, smooth, and not transparent. It distended the mucosa, whose color was normal. The tumor was soft, and gave rise to an indefinite fluctuation. It hindered the movements of the tongue, which were otherwise normal.

After puncture sebaceous matter made its exit, and the cavity of the cyst was swabbed out with a solution of nitrate of silver, and a drainage-tube was inserted. The result of this was that an acute inflammatory process was set up, which finally resulted in the spontaneous elimination of the emptied cyst.

CASE XL. (Paget.)—A cyst was situated under the tongue of a small girl, occupying the median line of the floor of the mouth, and had the appearance of an abscess. It had been incised twice, which had given exit to a thick liquid similar to pus. As the trouble had recurred, the growth was dissected out and was found to be a cyst measuring about three-quarters of an inch in diameter, with an internal surface composed of an epidermis from which grew a few fine hairs. The papillæ of the chorion and that part of the chorion situated below the rete Malpighi were impregnated with a black granular pigment, but the rete Malpighi itself was not pigmented.

CASE XLI. (Farwell.)—Female, aged seventeen years, with tumor, situated under the tongue, about the size of a small orange. It filled the mouth, and pushed the tongue toward the roof in such a way that the patient could not swallow solid food. In every other way she was well, but stated that she had always had a small enlargement under the tongue as far back as her memory could go, and that the growth had increased in size only during the last three months. A physician had incised the tumor, but the opening closed up after this operation, and the tumor had increased in size so that it was larger than before this operation.

The anterior wall of the growth was seized with forceps and, after excision of a large portion of the anterior wall of the cyst, a large quantity of thick, sebaceous matter containing hair was evacuated. The wound rapidly healed, and nine months after there was no recurrence.

CASE XLII. (Gerard-Marchant.)—Female, aged twenty-four years; had had from birth a tumor which projected into the mouth and under the chin. The growth had little by little increased in size, and had now attained such a volume as to functionally disturb the patient. Local examination showed a tumefaction in the suprahyoid and sublingual region. A median projection existed, which pushed forward the skin of the submaxillary region and projected under the sublingual mucosa. Both mucous membrane and skin were perfectly normal and in no way adherent to the growth.

By palpation the cyst appeared freely movable, and could be pushed up and down from the suprahyoid region into the buccal cavity, and vice versa. It was rounded and about the size of an egg, but the entire outline and growth were difficult to ascertain because part of it was deeply situated. Fluctuation could not be elicited, but the growth seemed elastic. Pressure with the finger on the growth left no imprint. The tumor moved with the os hyoid during deglutition, and if at this time an endeavor was made to separate the growth from the bone it was found adherent to the latter.

The cyst was dissected out by an incision in the suprahyoid region and was found situated between the geniohyoid and genioglossal muscles, surrounded by a loose cellular tissue and easily dissected out with the finger, excepting in the region of the os hyoid, to which it intimately adhered by bands of fibrous tissue.

A careful and detailed histological examination showed the growth to be a dermoid cyst.

In looking over the literature of dermoid cysts of the floor of the mouth I have been able to find a number of other instances, but as no histological examination had been made, and as they were recorded superficially, I have thought best not to include them in the list of cases here reported, fearing that they might not be true dermoid cysts. Cysts of the tongue of a dermoid nature are extremely rare, and I have only been able to find two cases where I think, from the microscopical examination, that the growth was a true dermoid: one was reported by Verchère and Denucé, the other by Lediard. Other cases of congenital cysts of the tongue have been reported by Gerster, Hadden, and others; but, from the careful perusal of the published reports of these cases, I am more inclined to believe that they were, without any doubt, mucoid and not dermoid productions.

REVIEWS.

PROGRESSIVE MEDICINE—A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES, AND IMPROVEMENTS IN THE MEDICAL AND SURGICAL SCIENCES. Edited by HOBART A. HARE, M.D., assisted by H. R. M. LANDIS, M.D. Vol. IV., December, 1901. Philadelphia and New York: Lea Brothers & Co., 1901.

THE discontinuance during late years of the *Index Medicus* has put upon such reviews of medical and surgical progress as *Progressive Medicine* an increased responsibility and value, since upon them the busy man must depend not only for his information regarding current literature, but to them he must also look for reference to articles which he may wish to read in full.

The first portion of this last volume of 1901 deals with Diseases of the Digestive Tract, and presents much that is of interest both to the medical man and the surgeon, since under this head is presented the late literature relating to gastric ulcer, intestinal perforation, appendicitis, etc. The interest which the profession has lately taken in diseases of the pancreas, and the progress which has been made in the treatment of these, is shown by the number of writers quoted and the results obtained by surgical treatment. We regret to note the omission of J. Collins Warren's very important article on the subject of "The Surgery of the Spleen" (*Annals of Surgery*, May, 1901) in the brief page allotted to this organ.

The chapters devoted to Genito-urinary Diseases impress us as being of the greatest value, presenting, as they do, numerous references to recent literature, and the author has shown most excellent judgment in his choice of articles worthy of review. Certainly few papers pertaining to the subject have escaped his notice. The small amount of space, however, which is given to the subject of syphilis is noticeable.

Following this part of the book is that which deals with Anæsthetics, Operative Technique, and Wound Treatment, Infection, Diabetic Gangrene, and Examination of the Blood in Surgical Cases. Although only the subjects above mentioned are dealt with, this division of the book has the heading "Anæsthetics, Fractures, Dislocations, Amputations, Surgery of the Extremities, and Orthopedics." This, we feel, is a mistake, and is apt to be misleading, and perhaps disappointing to the reader. The chapter on Anæsthetics is highly to be commended, as it presents in readable and comprehensive style practically all the recent and good literature on the subject. The portion relating to local anæsthesia is rightly given considerable space, in which the technique of the procedure is carefully detailed. The chapter on Examination of the Blood in Surgical Cases is extensive, and contains much that is of interest from a diagnostic point of view.

The next division of the book relates to Diseases of the Kidneys, and under this heading are discussed Oxaluria, Functional Albuminuria,

Urinary Changes in Gastro-enteritis, Bright's Disease in the Young, the Varieties of Uræmia, etc.

The three last divisions of the book deal with Physiology, Hygiene, and Practical Therapeutics. Nothing strikingly new appears under the head of Physiology, but much that will be found of interest in regard to Metabolism, Absorption, the Nervous System, etc. The portion on Hygiene presents the literature of the year relating to Tuberculosis, Yellow Fever, the Restriction and Prevention of Typhoid Fever, etc. The closing chapter discusses in a clear way the recent advances made in Practical Therapeutics, and will be found of value to those seeking new knowledge in this department of medicine. J. H. G.

A System of Physiologic Therapeutics. Edited by Solomon Solis Cohen, A.M., M.D. Climatology, Health Resorts, Mineral Springs, by F. Parkes Weber, M.A., M.D., F.R.C.P. (Lond), Physician to the German Hospital, Dalston; Assistant Physician to North London Hospital for Consumption; author of "The Mineral Waters and Health Resorts of Europe," with the Collaboration for America, by Guy Hinsdale, A.M., M.D., Secretary of the American Climatological Association; President of the Pennsylvania Society for the Prevention of Tuberculosis; formerly Lecturer on Medical Climatology in the University of Pennsylvania. Vol. III., pp. xiii., 336. Vol. IV., pp. xiii., 420. Illustrated with maps. Philadelphia: P. Blakiston's Son & Co., 1901.

Therapeutics implies the application of remedial measures in the treatment of disease; it is not limited to drugs. These volumes, forming a part of a series, deal with climatology to form one phase of what the editor designates as a practical exposition of the methods, other than drug-giving, useful in the prevention of disease and in the treatment of the sick. Thus far the subject discussed falls under the title of "Therapeutics;" but to assume that these non-drug methods cover all that is conveyed by the term "Physiologic Therapeutics" is to ignore the plain teachings and accepted literature of pharmacology. We like the idea of grouping together mechanical and gross physical agencies, for with the gathering together of *ex parte* arguments by various eager and presumably qualified persons we can more readily ascertain the basis of their claims and test the soundness of the logic by which they reach their conclusions. We approve of making use of every aid upon which we may levy for the lessening of human misery, and in the present enlightened condition of the profession we are not over-particular as to its source, even if a given method has been exploited by charlatans. Thus, electricity, mechanotherapy, and pneumatotherapy have already come, and hydrotherapy is now coming, into legitimate use. But with their use by intelligent and discriminating practitioners the glamour of their results becomes dimmed, and the logic of established facts soon determines their true worth. Each and every one ceases to be a panacea, but each and every method is capable of rendering more good to the world at large because of its more intelligent application. As a matter of fact, volumes

like these are of twofold service—they demonstrate to the physician that outside of his particular environment are agencies capable of accomplishing that for which he may possibly be striving in vain, and that no one place is sole proprietor of all the favorable auspices under which patients may live. Further than this, the very conscientiously gathered information and the transparent frankness of the authors impress the reader with the variety of health resorts and the good which their judicious election may entail. The first part consists of fifty pages devoted to Physics, Physiology, and General Therapeutics of Climate; next comes the bulk of the work, covering a detailed description of health resorts in every quarter of the globe, some presented on suspicion; and, finally, the third part of 140 pages, indicating how particular diseases and conditions may be benefited by a sojourn at various localities. Anyone who considers that this is a compilation of undigested and indigestible material gives little credit to the patience, discrimination, and learning of the authors. Whoever expects to find extravagant claims or unwarranted laudation will look in vain. One who searches for evidences of credulity on the part of the authors will be disappointed. The volumes are conscientious and adequate, full and yet compact. If we might yield to national pride, we would say that the work done by the American Climatological Society has borne mature fruit, and young as we are we have more information of practical bearing than has accumulated during centuries of old-world observation. Among the best of good work we would put in a prominent place "The Hawaiian Islands," by Coan, written quite likely *con amore*, a model of terse statements and clean cut, idiomatic English. We find but little in the book for adverse comment: "Everyone nowadays admits that tabes dorsalis and general paralysis of the insane seldom occur in persons who have not had syphilis" (vol. iv., p. 280) hardly correctly states the facts, and the classing of hydrotherapy (vol. iv., p. 313) as preventive treatment of pulmonary tuberculosis scarcely reaches the exaggerated height of our water-curists. In many places we note the belief of the authors that drugs are not without effect even in health resorts. In conclusion, we know of no better source than these volumes which the physician may consult in the interest of his patients, or the average reader peruse, that he may add to his store of information. R. W. W.

THE HYGIENE OF TRANSMISSIBLE DISEASES: THEIR CAUSATION, MODES OF DISSEMINATION AND METHODS OF PREVENTION. BY A. C. ABBOTT, M.D., Professor of Hygiene and Bacteriology, and Director of the Laboratory of Hygiene, University of Pennsylvania. Pp. 350. Philadelphia and London: W. B. Saunders & Co., 1901.

THE second edition of this most valuable and interesting book omits nothing of importance which the advances in medical research have brought out on the subject of transmissible diseases since the appearance of the first edition two years ago. The chapter on Typhoid Fever is enlarged and contains some new and instructive charts. That on Dysentery is revised and enlarged, and includes a discussion as to the propriety of the ordinary usage of the term. In the consideration of

prophylaxis in tuberculosis statistics are given which show the very large percentage of deaths from this disease in a half-dozen of the large cities of the United States—six and more times as great as that from four of the leading so-called zymotic diseases combined. The author advocates the education of the patient, so that he may not become a public menace, the establishment of public sanatoria for such as cannot look after themselves, and the registration of all cases, whatever their clinical manifestations. The chapter on Bubonic Plague is largely rewritten, and includes new sections on protective inoculations, special quarantine measures, and the rôle of rats in its dissemination. Especially interesting in the chapter on Malaria is the discussion of the rôle of the mosquito as the disseminating agent. The chapter on Yellow Fever covers the advances in our knowledge of the etiology of this disease due to the researches of medical officers of the United States Army and Marine Hospital Service. In the consideration of other of the transmissible diseases whatever is new has been incorporated, and the whole work is quite abreast of the times. The book is commendable in the highest degree in all respects, and should be in the hands of every progressive practitioner and public health authority. C. H.

ANÆSTHETICS AND THEIR ADMINISTRATION: A TEXT-BOOK FOR MEDICAL AND DENTAL PRACTITIONERS AND STUDENTS. By FREDERICK HEWITT, M.A., M.D. Cantab., Anæsthetist to His Majesty the King; Anæsthetist and Instructor in Anæsthetics at the London Hospital; Late Anæsthetist at the Charing Cross Hospital, and at the Dental Hospital of London. Second edition. New York: The Macmillan Co.

THE second edition of Hewitt's work is substantially a new one, as it has been thoroughly revised and its scope extended so as to include the history and experimental physiology of general anæsthetics, and we may here suggest that the title be changed to "General Anæsthetics and their Administration," as they alone are discussed. As the author states, a student's opportunities for becoming a proficient anæsthetist are lamentably inadequate. Experience is a vivid and impressive teacher, but it is hard on the patients. Hewitt's book will supply the want felt by a lack of experience as well as any book can. While purporting to be a work for the advanced student, we believe it will be of greater value to the casual anæsthetist in private practice and the evanescent one of our hospitals. With great detail, with many references to literature, and with the citation of illustrative cases from an enormous experience, to carry conviction, the chemical, physical, physiological, and clinical aspects of this important subject are dealt with. This prolixity on some of the pages may be adversely criticised. Frequent repetitions and cross-references, however, add to our understanding, even though they sacrifice our time. There are 500 clear-typed pages, containing 59 illustrations, mostly of apparatus. The index is above the average, and will help to balance the arrangement of the book, which is below the average.

The writer points out the analogies between simple anoxæmia and general anæsthesia, and thinks that future experimentation may lead

us to conclude that general anæsthesia is produced by a limitation of oxidation upon which the nerve centres depend for the execution of their functions. The much-disputed point whether chloroform has or has not a depressing effect on the heart is settled in the affirmative. Nitrous oxide and ether are regarded as the routine anæsthetics, the former for very short, the latter for longer operations; but routine is set aside in certain cases, owing to the condition of the patient or nature of the operation, both of which are elaborately considered in that portion of the treatise dealing with the selection of anæsthetics. The fact that children are as susceptible as adults to the toxic effects of chloroform is pointed out. Concerning nitrous oxide and oxygen the writer says the anæsthesia is comparatively light, inconvenient reflexes are prone to arise, and that it may be recommended in carefully selected cases, but not for general use, although it is the safest method known, no fatalities having been recorded. Ethyl chloride is said to be less suitable than other anæsthetics, owing to the fact that the muscular system does not, as a rule, become relaxed. The management and treatment of the difficulties, accidents, and dangers of general anæsthesia are gone into with as much thoroughness as possible, sixty pages being thus consumed. We fear too much stress has been laid on vigorous traction of the tongue, which, in itself, may inhibit cardiac and respiratory action, and not enough on the value of atropine.

Americans will object to the late Dr. Evans being spoken of as an English dentist.

To crystallize our opinion of this edition, we may say that it is an exceedingly valuable work, which may be studied with profit by surgeons, specialists in anæsthetics, hospital residents, and all others who may be called upon to administer general anæsthetics. F. T. S.

DISEASES OF THE HEART: A CLINICAL TEXT-BOOK FOR THE USE OF STUDENTS AND PRACTITIONERS OF MEDICINE. By EDMUND HENRY COLBECK, M.D., Physician to Out-patients at the City of London Hospital for Diseases of the Chest; Late House Physician at St. Mary's Hospital, etc. London: Methuen & Co., 1901.

THE diseases of the heart and circulatory system must always be a subject presenting serious difficulties to the student of medicine, and even to the practitioner whose early training has not given him the advantages of an extensive hospital service under competent clinical teachers.

The author of the present volume, who has served his apprenticeship at the right hand of so brilliant a clinician as Sir William Broadbent, has thus approached his task with an adequate conception of the inherent difficulties that present themselves to the student. As a result he has succeeded in producing a very concise and comprehensive study, which may be taken to exemplify the latest teaching of the English school.

It is no disparagement of his work, however, to express the doubt that the average undergraduate student of medicine is sufficiently prepared

to make the best use of a text-book that so exhaustively covers the subject as the volume before us. On the other hand, it is a pleasure to note that it is admirably suited to the needs of the practitioner and the clinical worker who has already mastered the broad principles of the subject and looks for a comprehensive guide in his bedside studies of the heart and its diseases.

The treatise covers 336 pages of closely printed text. Controversial matter has been to a large extent omitted, the most generally accepted theories being given their due prominence, and the confusion attaching to the discussion of opposing views being largely avoided. The style is clear and forcible, and the division and classification of the subject-matter is made more striking by skilful management of headings in boldface type.

The chapters on Methods of Diagnosis, the Pulse, and Diseases of the Myocardium are especially noteworthy for breadth of grasp and exhaustiveness of treatment.

Altogether, this is one of the best books on the subject that has recently appeared, and it deserves, as it will doubtless command, a goodly measure of success. T. S. W.

A Text-book of Gynecology. Edited by Charles A. L. Reed, A. M., M.D., President of the American Medical Association; Gynecologist and Clinical Lecturer on the Surgical Diseases of Women at the Cincinnati Hospital; Fellow of the American Association of Obstetricians and Gynecologists, etc. New York: D. Appleton & Co., 1901.

In the preparation of this work the author, while aiming to produce a volume which should be entirely up to date, did not intend to simply collect a number of papers by various authorities. He therefore, while inviting the co-operation of a large number of men in its preparation, has carefully arranged their contributions with the idea of producing a unity of style and a consecutiveness of statement. In the present state of rapid advancement in the subject there seems to be no other way to accomplish his aim. Of course, a certain amount of individuality is wanting, but his work has been done so well that this is hardly noticeable, and the advantages gained far outweigh, in our opinion, any possible disadvantages.

The scope of the volume is a large one, as the author departs from the narrow limits of the older books on gynecology, and, in accordance with the recent works on the subject, extends his boundaries to include the majority of surgical conditions found in woman between the diaphragm and the pelvic outlet. He thus includes a very complete chapter upon the urinary affections, and gives considerable space to a discussion of the kidney. Regarding this organ, the treatment when its mobility demands an operation is limited, by the preference of the author, to an actual stitching to the fascia—a narrowness of view which seems rather unfortunate when we consider the success following the use of the gauze pack and the rubber drainage-tube, methods which do not seem to have the subsequent dangers of the stitch.

A chapter on the History of Gynecology is of interest as showing how little is really new under the sun; while the chapter on the Gen-

eral Pathology of the Reproductive Organs as compared with general changes occurring in other parts of the body will well repay careful perusal. In his chapter on the General Medicinal and Local Treatment of Disease he gives an account of pelvic massage, and sums up the dangers of this treatment, which promised so much at the first, but which, as he well points out, has but a limited scope. The difficulties in determining the proper cases for its employment are mentioned, and a much-needed caution is given as to the dangers incident to pelvic examinations under ether in a case in which the type of pain would indicate the possibility of the presence of pus.

The close relationship existing between the subjects of obstetrics and gynecology is acknowledged by the inclusion of a chapter on Cæsarean Section, which adds considerably to the value of the book.

A chapter on Tubal Infections, in which, among other methods of treatment, a description of the cases suitable for vaginal puncture is included, is of great interest and value.

Any review of this work would be incomplete if the last chapter were passed over without reference. There is probably no one part of the whole subject which has given rise to more acrimonious discussion, to say nothing of the unnecessary suffering entailed upon a very unfortunate class of women, than the question of the interdependence of nervous conditions and gynecological disease. In the last chapter the subject is considered from the stand-point of the gynecologist, hysteria and neurasthenia being the two phases considered, and the conclusions deduced as the result of the large experience of the author will appeal to the thoughtful physician as sound. W. R. N.

A Treatise on Plague: The Conditions for its Causation, Prevalence, Incidence, Immunity, Prevention, and Treatment. By Major George S. Thomson, M.B., M.Ch., M.O.A. (Roy. Univ. Irel.), I.M.S. (Bombay); and Dr. John Thomson, M.R.C.S.I., L.R.C.P.I., Special Plague Officer under the Government of Bombay. Pp. 299. London: Swan Sonnenschein & Co., Ltd., 1901.

This work is essentially a plea for improved sanitation as a defence against plague; for cleanliness, ventilation, and avoidance of overcrowding in place of routine disinfection. It is very largely an elaboration of Pettenkofer's argument that for the raising of crops two factors are essential, namely, the seed and the proper soil, neither of which alone can produce results. It contains much that is clinically, historically, and otherwise interesting, but not a great deal that is new. No topic germane to the subject has been neglected, but the arrangement is exceedingly bad, and the whole work lacks connection. Many subjects which might well be considered by themselves in separate chapters are treated piecemeal here and there, so that much of the book is a hopeless jumble; and, to crown all, there is no index. The first part of the book is especially remarkable for its unusually bad and difficult style, and the whole is marred by an offensive intolerance in discussion. Of both of these faults the following may serve as a fair example: "That destruction of rats is a useful palliative measure of a purely temporary benefit

no one denies—*e. g.*, Kitasato reports on the limitations of outbreaks at Kobe and Osaka, which he attributed to the measures adopted, and where it is believed the epidemic would have attained much larger proportions had not so many rats been destroyed. First it was the use of the whitewash brush; now the abuse of the rat. Imbecility could hardly go further or show greater impotency; but an imbecile's reasoning faculties were always *non est* over those of many guides, and seem only in abeyance, we can charitably suppose."

Among the most interesting portions of the book may be mentioned the account of the epidemic in Satara City, which gives a graphic description of the mode of life of the natives, and the chapter on Haffkine's Prophylactic Inoculation, which measure, the authors believe, should be encouraged in spite of the fact that it can never be the sole remedy against the disease, and that, by leading to a false sense of security, it postpones the day of deliverance from its inroads.

C. H.

A Reference Hand-Book of the Medical Sciences, Embracing the Entire Range of Scientific and Practical Medicine and Allied Science. By Various Writers. A new edition, completely revised and rewritten. Edited by Albert H. Buck, M.D., of New York City. Vol. III. Illustrated by chromo-lithographs and 676 half-tone and wood engravings. New York: William Wood & Co, 1901.

This volume of the *Reference Hand-Book*, beginning with about the middle of the letter C and ending with about the middle of the letter E, includes in its pages many articles on most important subjects. Among the sections especially to be noticed are those upon the Circulation of the Blood, which is ably considered by Dr. Dreyer, and the Cranial Nerves, by Dr. C. Judson Herrick. These two authorities consider these physiological topics in a way which makes their articles of great value to the physician who desires to look up points in the physiology of the subjects under discussion. To the specialist in otology the present volume will be of the greatest interest, nearly 100 of its large pages being devoted to the consideration of topics connected with the ear and its diseases, each subject being written of by an authority upon it. The illustrations of the various pathological conditions of the ear are most valuable, and, taken altogether, the section on the Ear and its Diseases may be regarded in the light of an excellent epitome or small manual on the subject. The Pathology and Treatment of Dislocations are given lengthy discussion. Buller's discussion of the Diseases of the Cornea, though somewhat brief, will prove of decided value to the general practitioner, into whose hands these cases usually fall before they are seen by the oculist. A topic of interest to all physicians is Deaf-mutism, which is ably written of by Dr. Gallaudet. It is impossible in reviewing so large and varied a collection of articles upon so many different subjects to pick out all of those worthy of particular mention. A few of the other articles which possess particular interest are those on the Decidua, by A. S. Warthin; Epilepsy, by Allan McLane Hamilton; Dietetics, by B. Franklin Stahl, and especially that on Dysentery, by W. W. Johnson.

A work of this character, so fully up to data, so complete in each individual article, so thorough in the range which it covers, possesses the very greatest value to all physicians, no matter in what branch of work they may be occupied. It constitutes a most complete encyclopædia of the medical sciences. F. R. P.

LECTURES ON THE SUPPURATIONS OF THE MIDDLE EAR AND THE ACCESSORY CAVITIES OF THE NOSE AND THEIR INTRACRANIAL COMPLICATIONS. By DR. HENRY LUC. 8vo. pp. 500. 26 illustrations. Baillière, Paris, 1901.

LUC's excellent treatise adopts a broader point of view than has often been taken, and deals with all forms of pericranial suppuration, with their intracranial extension, and this not merely from the position of the surgeon executing operations within the cranium for relief of these consequences, still less of the pathologist studying their extensions and etiology only, but of the clinician actively engaged in forestalling them. Therefore, while his book appeals most to the specialist in aural and nasal diseases, it is a most valuable study for the operative surgeon and the general practitioner, however much in its specialized parts it goes beyond the limits which they would set themselves as to following his procedures.

In his treatment of acute tympanic suppuration, Luc strongly favors free incision of the drumhead with inflation by Politzer or catheter, and the instillation of carbolized glycerin. He then tampons lightly for drainage, using a wick of gauze strip or a series of cotton pellets, and between the daily dressings covers with a light bandage. Where this is impracticable the hot douche is to be employed. After relief of pain, at the end of one or two weeks, he substitutes peroxide, cleansing and boric insufflations.

For the chronic suppurations he differentiates the various more common forms, according as the perforation is small or large, is in the Shrapnell membrane or below, and complicated or not with polypi or cholesteatoma. He makes good use of attic irrigation and the bent probe, yet might claim more success if still more thorough in their use. While this is not to be often expected of any but the specialist, it is really well within the powers of any careful practitioner, and deserves far more vigorous commendation.

Failing success within a few weeks or months in which good local treatment has been conscientiously employed, he advises operation; first, the simple excision of the ossicles, and, if after six weeks this remains unsuccessful, then the exenteration of the tympanic cavities. This he does after Stacke's method, cauterizing the field with a $\frac{5}{10}$ zinc chloride solution, and packing with iodoform gauze, in later operations with suturing of the mastoid wound. He dresses only after eight days, as a rule, then every two to four days, and looks for a cure in two to six months.

For chronic mastoid suppuration he counsels the radical tympano-exenteration, and his descriptions of the operative technique in all these respects is almost too minutely full. In dealing with the accessory

cavities of the nose he is similarly thorough in theory, and perhaps in practice, and his technical descriptions are generally excellent. As usual, he credits to Heryng (International Congress, 1889) the priority for transillumination of the maxillary sinus which Addinell Hewson had well demonstrated four years earlier (Pennsylvania State Society, 1885); and in dealing with the acute phases of sinus inflammation has only hot fomentations and steam inhalations in his therapy, without mention of the nearly specific effect of atropia and the freeing of the natural passages by cocaine and adrenal locally.

The outcome of these various conditions in inflammation, thrombosis, or abscess-formation within the cranial cavity are excellently set forth. Rather striking at first glance are his employment of the galvano-cautery not solely for searing the infected dural surfaces of sinus or cranial fossæ before incising them, but in enlarging the opening of brain abscess and in removing the cerebral hernia; and where many operators cautiously irrigate within the dura only with boric or salt solution, he employs 1 : 2000 bichloride. B. A. R.

THE PHYSICIAN'S VISITING LIST FOR 1902. Philadelphia: P. Blakiston's Son & Co.

THIS useful little publication will be welcomed as usual by its friends in the profession as it makes its yearly appearance. It is small, neat, and compact, and the fact that it is entering its fifty-first year speaks volumes for its popularity. Its arrangement is similar to most other visiting lists, having sets of tables for reference in the front, followed by pages for the daily record of cases (arranged for twenty-five names weekly), births, deaths, vaccinations, cash accounts, etc. Bound attractively in soft black leather, it fits the pocket easily. A visiting list is a necessity to the physician, as it is to it that he must turn for his data if the legality or justice of his charges is questioned. G. M. C.

NERVOUS AND MENTAL DISEASES. By ARCHIBALD CHURCH, M.D., Professor of Nervous and Mental Diseases and Head of Neurological Department, Northwestern University Medical School; and FREDERICK PETERSON, M D., Chief of Clinic, Department of Nervous and Mental Diseases, and Clinical Lecturer on Psychiatry, College of Physicians and Surgeons, New York. Third edition, revised and enlarged. Pp. 870, with 322 illustrations. Philadelphia and London: W. B. Saunders & Co., 1901.

A BOOK on nervous and mental diseases which has reached a third edition in so short a time needs no review, and has proven its right to be. This edition has been revised, new illustrations added, and some new matter, and really is two books; the part on Nervous Diseases having been written by Dr. Church, while Dr. Peterson is responsible for the section on Mental Diseases. The descriptions of disease are clear, directions as to treatment definite, and disputed matters and theories are omitted. Altogether it is a most useful text-book.

C. W. B.

CRAZES, CREDULITIES, AND CHRISTIAN SCIENCE. By CHARLES M. OUGHTON, M.D. Chicago: E. H. Colegrove, 1901.

IN writing his little book on the various kinds of delusions by which the human race has been deceived from time to time, concluding with the form of imbecility which is now prevalent under the name of Christian Science, Dr. Oughton states that he has endeavored to avoid controversial discussion. It is, however, impossible to write a book of this kind in which the blasphemous and unscientific claims of Christian Science are exploited without exciting the spirit of controversy in its benighted disciples. It seems to us that it is a pity that any notice should be taken of a propaganda which exists solely for the purpose of making money for its priesthood, and thrives upon the ignorance of its victims.

The best way to effectually suppress a thing like Christian Science is to ignore it absolutely, as it deserves. It is unworthy of men of science or religion to attempt an argument on a subject which presents but one side. Dr. Oughton's book is well written, and for those who have not looked into the subject it brings forward many of the salient points of Christian Science which are merely the claims of its founder to a sort of Godhead.

Of course, the arguments of Dr. Oughton are unanswerable, but whether they will succeed in convincing the persons who would yield to such a delusion of the foolishness of their ways is open to question.

F. R. P.

THE MEDICAL NEWS VISITING LIST FOR 1902. Weekly (dated, for 30 patients; Monthly (undated, for 120 patients per month); Perpetual (undated, for 30 patients weekly per year); and Perpetual (undated, for 60 patients weekly per year). The first three styles contain 32 pages of data and 160 pages of blanks. The 60-patient Perpetual consists of 256 pages of blanks. Philadelphia and New York: Lea Brothers & Co.

THIS *Visiting List* has been before the profession for so many years and has established itself so firmly as an indispensable adjunct to the physician's outfit that it is almost superfluous to again direct attention to its merits. Its convenient size and its very practical arrangement (the pages being arranged for special data, such as obstetrical engagements, vaccinations, patients' addresses, and cash accounts) combine to form a visiting list which has fully justified its great success.

When the importance of a visiting list in its medico-legal aspect is recognized the value of as perfect a one as the present must be apparent. It should be remembered that the visiting list constitutes the physician's legal record, which alone he can present as testimony in court in cases in which he sues for the collection of money due. This renders it all important that such record should be kept with simplicity and in an easily explainable manner.

Thirty-two pages of tables of various kinds, doses, arithmetical conversion tables, etc., accompany the book, and, being well chosen and such as are of real value, add greatly to its usefulness. J. H. G.

THE MENTAL FUNCTIONS OF THE BRAIN: AN INVESTIGATION INTO THEIR LOCALIZATION AND THEIR MANIFESTATIONS IN HEALTH AND DISEASE. By BERNARD HOLLANDER, M.D. (Freiburg, B.), M.R.C.S., L.R.C.P. (London). New York and London: G. P. Putnam's Sons, 1901.

THERE is a type of mind that always takes the view contrary to that which is commonly accepted, and on the one hand makes heroes of the dead who have been relegated to low rank; or, on the other hand, tears off the mask of greatness from the world's favorites. Such persons may sometimes be necessary, but, as a rule, they get little thanks for their labor. The author seems to belong to the former class. His book is a defence of Gall, whom he ranks among the greatest of students and geniuses. He states that his book "is the first work on the subject [clearing up the mystery of the fundamental psychical functions and their localization in the brain] since the dawn of modern scientific research." The gentleman thus shows himself self-reliant if not a little egotistical. He bases his opinion on 800 cases, and has studied medical literature with much attention. The book is the product of fifteen years of investigation. May we say frankly we think those years have been largely wasted. The book is written in good faith, but lacks convincing power.

C. W. B.

THE ACCESSORY SINUSES OF THE NOSE: THEIR SURGICAL ANATOMY AND THE DIAGNOSIS AND TREATMENT OF THEIR INFLAMMATORY AFFECTIONS. By A. LOGAN TURNER, M.D. (Edin.), F.R.C.S. (Edin.), Surgeon for Diseases of the Ear and Throat, Deaconess' Hospital, Edinburgh. With forty plates and eighty-one figures. Edinburgh: William Green & Sons, 1901.

IN this handsomely got-up volume of 204 pages of text there are inserted forty plates and eighty-one figures illustrative of the subject-matter. The book may be properly described as an atlas of the anatomy and surgical pathology of the accessory nasal cavities. The illustrations are most of them photographs of frozen sections or of sawed skulls. They are particularly well executed and chosen to illustrate the points which the author presents in the text. The maxillary, frontal, ethmoidal, and sphenoidal sinuses are taken up in turn and their normal and pathological anatomy carefully considered. The particular value to be attached to Dr. Turner's work is its practical usefulness to those who are engaged in the operative treatment of diseases of the nose and throat. We know of no work of this character that so thoroughly elucidates the anatomical relations in these structures.

The portion of the book devoted to diagnosis and treatment is presented in such a concise manner that it has not been possible for the author to elaborate the subject as it deserves; but these matters have been so fully considered by Grünwald and others in their monographs that we think Dr. Turner has done wisely in sacrificing the consideration of this portion of his subject to the much more important matter that precedes it. The work should be in the hands of every specialist in laryngology and rhinology.

F. R. P.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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On Tuberculous Strictures of the Small Intestine.—FIBIGER (*Nord. med. Archiv*, 1901, Afd. ii., xxxiv., h. 2, No. 8) reports four cases of tuberculous strictures of the small intestine, two of multiple cicatricial strictures and two of multiple hypertrophic strictures. A careful anatomical study of the first two cases leads the author to the following conclusions:

1. That the process of healing in tuberculous strictures may be so far advanced that all characteristic tuberculous tissue changes and tubercle bacilli may have disappeared. That the strictures caused by tuberculosis may be impossible to recognize in these cases on microscopical investigation.

2. That when the process of healing is less advanced, and the strictures still show ulceration, the diagnosis may still be remarkably difficult and only possible by the most minute microscopical investigation. Indeed, the tuberculous nature of intestinal strictures can be excluded only where the microscopical examination of the intestine itself, of the mesenteric glands, and of the liver has shown that these organs contain no tubercle bacilli and no tuberculous tissue changes, and where, also, inoculations of guinea-pigs have a negative result.

The author then analyzes fourteen instances of syphilitic strictures of the small intestine reported in the literature. In a large proportion of these instances the pathological investigation of the case is shown to have been insufficient to justify a positive diagnosis of syphilis, and in many the possibility of tuberculosis must be acknowledged. In two cases of hypertrophic strictures of the small intestine which have been carefully studied by the author, and were unquestionably of tuberculous origin, there was found a proliferative obliterating endophlebitis of certain veins in the mesentery. These changes were entirely analogous to those which have been described in syphilis changes, the discovery of which formed the main argument for

classing one, at least, of the best studied cases of so-called syphilitic stricture of the intestine under that heading. The author concludes: "There are in the literature only very occasional descriptions of affections of the small intestine with fibrous, retracting processes and tumor-like infiltrations of the intestinal wall. It seems natural to interpret these phenomena as scar formation in gummous nodes in the intestinal wall, and there is no reason to doubt the syphilitic nature of these cases."

This, however, does not hold for the far commoner cases of so-called syphilitic strictures of the small intestine. That some of these are of syphilitic origin is, naturally, possible; but it must be emphasized that the changes described may be ascribed to another etiology. No positive proofs have been offered that these cases were caused by tuberculosis, and it is probable that the majority were, as a matter of fact, tuberculous strictures.

The Relation Between Accidents and Diabetes.—HIRSCHFELD (*Deutsche med. Wochenschrift*, 1901, xxvii., 571), in an address before the Berliner Verein für innere Medizin, concludes that a definitely dependent relation of diabetes upon trauma is in some cases distinctly recognizable. These are instances of nervous diabetes where we must suspect that there has been a direct action upon the central nervous system. In these cases recovery or extensive improvement seems to be relatively common.

It is also possible that an accident may bring about diabetes in an individual who has previously suffered from some pancreatic disease. Finally, definite pancreatic disease may arise as a result of injury, cysts, hemorrhages, and perhaps also chronic inflammation

An accident may also have an unfavorable influence upon an already existing diabetes, the most important being its action in determining the onset of coma. In some of these cases coma is so readily excited that there may be question as to its relation to the injury, but in minor cases the relation of the accident to the onset of the coma seems unquestioned.

It is also probable that in some instances an injury may be the determining cause of gangrene where otherwise the existing vascular changes might have pursued their course without evil result.

The capability of the majority of diabetics for heavy muscular exercise is materially diminished.

Mixed Infection of Typhoid Fever and Malaria.—FIOCCA (*Il Policlinico*, 1901, viii., M. 477) reports the interesting case of a patient who, after having suffered with unquestioned malarial fever, returned three weeks later with a continued fever which proved to be typhoid. This ran a typical course, lasting thirty-nine days. During defervescence quinine was given on account of the markedly intermittent character of the fever, but without effect. The nature of the fever was unquestioned both on account of the clinical symptoms and owing to the positive Widal test. On the eighth day after the return of the temperature to normal there occurred a chill; examination of the blood showed characteristic æstivo-autumnal parasites.

Vigorous treatment with quinine was immediately instituted, the temperature remaining normal thereafter for seven days, following which there was a relapse of the typhoid fever of nine days' duration. During all this

period no parasites were found in the blood. On the tenth day after this there was a second characteristic malarial paroxysm, which yielded again to quinine. Parasites were again found in the blood.

The author in the beginning emphasizes the fact that the conception of a clinical picture characteristic of combined typhoid and malarial infections is an entirely false one, and in commenting upon this case he justly observes: "This case, besides offering convincing evidence of the existence in the same subject of typhoid and malarial infection, serves further to demonstrate, if, indeed, there be need of such a demonstration, that the combination of the two infectious processes in such a manner as to produce a separate clinical entity (typhomalarial) is a hypothetical conception which is not met with in reality."

Pancreatic Necrosis following Trauma.—SELBERG (*Berlin. klin. Wochenschrift*, 1901, xxxviii., 923) reports an extremely interesting case of typical acute hemorrhagic and gangrenous pancreatitis following a kick by a horse. The patient, a man, aged thirty-nine years, was kicked in the epigastrium. He lost consciousness for a time, and on recovering suffered from intense abdominal pain. This was followed by a swelling in the epigastric region and dulness in the left lower chest. Eighteen days later he was admitted to the hospital, at which time he was suffering from marked epigastric pain. There was a doughy swelling along the free border of the ribs on the left; dulness in the lower half of the left chest and over the region of the stomach; evidences of fluid in the left pleural cavity; abdomen soft, but swollen; tympany in the median line; dulness in the flanks; when lying on the left side the elevated points were tympanitic; not so, however, when he lay on the right.

A diagnosis of perforative peritonitis was made, but no operation was performed owing to the hopeless condition of the patient, who died two days later. On autopsy, besides the pleural effusion, numerous fat necroses were found in the omentum; the head of the pancreas was wholly necrotic, the rest infiltrated with blood. The microscopical investigation of sections of the pancreas showed that the entire organ was necrotic, as well the glandular as the fatty tissue; the lymph nodules were well preserved.

The author ascribes the necrosis either to the escape of pancreatic juice—in support of which is the fact that the necroses were more numerous in the neighborhood of the wound—or to the possibility that necroses arose at a point or points as a direct result of the wound, into which bacteria afterward entered.

The Acid Intoxication of Diabetes in Its Relation to Prognosis.—HERTER (*The Journal of Experimental Medicine*, October 1, 1901, vol. v., No. 6, p. 617), in calling attention to the fact that it has been firmly established that diabetic coma is regularly associated with the excretion of large quantities of organic acids, states that comparatively little attention has been paid to the excretion of these acids during the period preceding the onset of coma. He reports an interesting series of cases in which the oxybutyric acid has been estimated, with especial reference to its prognostic importance.

The conclusions drawn from the study of these cases are as follows:

1. A careful balancing of the normal acids and bases of the urine makes it possible not merely to detect the presence of organic acids in the urine, but also to determine approximately the amount of such acid. The method recently described by Herter and Wakeman can be recommended as securing a greater degree of accuracy, for the amount of labor involved, than any other procedure.

2. The determination of the N of NH_3 is a useful procedure for clinical purposes, since it is probably true that a considerable excretion of organic acid (say 15 grammes oxybutyric, or more, in twenty-four hours) is always attended by an increased excretion of NH_3. As much organic acid as corresponds to 10 grammes oxybutyric acid may be excreted in twenty-four hours without causing an increased excretion of NH_3. We cannot rely on the ammonia output to detect moderate quantities of organic acid.

3. Where organic acids are removed in considerable amount without increasing the excretion of NH_3 the acid takes out other alkalies, probably in some instances chiefly K.

4. In cases of diabetic coma the urine always contains a large excess of organic acids, and the N of NH_3 is usually increased to 18 to 25 per cent. of the total N.

5. Crotonic acid can regularly be obtained from the urine of patients in diabetic coma.

6. The condition of diabetic coma is preceded by a period of days, weeks, or months, in which there is a large excretion of β-oxybutyric acid (20 grammes or more in twenty-four hours), and in which the N of NH_3 is largely increased.

7. Patients whose urines show or have shown a large excretion of organic acids are in danger of developing diabetic coma, but the N of NH_3 may temporarily rise as high as 16 per cent., and yet coma may be delayed for more than seven months. The persistent excretion of more than 25 grammes of β-oxybutyric acid indicates impending coma.

8. A patient passing 30 grammes of β-oxybutyric acid in twenty-four hours may still have enough energy and strength to be about all day and perform considerable muscular work.

9. A patient who has been excreting very little organic acid and has gained weight may, within a few months, show the presence of considerable quantities of organic acid, and die in typical diabetic coma.

10. When the urine contains little or no organic acid there is no immediate prospect of diabetic coma, but patients with such urine are probably liable to most of the other dangers that threaten diabetic patients. The relation between the degree of acid intoxication and the susceptibility to infection seems worthy of special experimental study.

11. Where the urine regularly contains more than 200 grammes of sugar per day there is usually considerable organic acid in the urine, and large amounts of acid, indicative of coma, are invariably accompanied by considerable or great glycosuria.

12. Sometimes there is much sugar and little or no acid in the urine, and sometimes there is considerable acid and little sugar. These facts render it desirable to examine the urine of diabetic patients at least once a month, with reference to the amount of acid excreted, for the element of acid

intoxication must be clearly separated from the element of glycosuria in our study of the progress of a case. In other words, we must recognize the acid intoxication as an important and sometimes as a dominant factor in the prognosis, and this element should be regarded even in those cases of diabetes which have the clinical indications of a mild type of the disease. We may thus hope to prolong life in many instances by taking precautions as to diet and out-of-door life which might not otherwise be deemed necessary.

13. The withdrawal of carbohydrate food frequently leads to a considerable reduction in the quantity of organic acids excreted. The reason for this is not yet clear, and the phenomenon deserves careful study.

On Albuminuria after Cold Baths.—Rem-Picci (*Policlinico*, 1901, viii., M. 389) reports observations upon thirty-five individuals who had altogether 115 baths. More than 350 analyses of the urine were made. The author concludes that albuminuria may be considered a constant phenomenon after cold baths. Different subjects react differently to cold baths taken under the same conditions. Those which show albuminuria more readily are, as a rule, the less robust and thinner individuals, such as are more sensitive to cold. The limits of temperature necessary to produce the phenomenon are from 12° to 13° C., when the immersion lasts no more than three minutes. If the temperature be from 15° to 20° C. the albumin appears only after fifteen minutes' immersion. Above this temperature albuminuria does not occur, even if the bath lasts much longer. The colder the bath the more rapid the appearance of albumin. Distinct albuminuria may occur eleven minutes after the end of a bath at 10.5° C. lasting ten minutes.

This albuminuria is of short duration, lasting several hours only. The milder the phenomenon the more transient it is. The cold-bath habit does not affect the appearance of albumin in the urine. The degree of albuminuria (serum albumin) is very slight; in the more marked cases the quantity barely reaches 0.25 gramme per mille. The sediment occasionally shows a few hyaline casts and often crystals of oxalate of lime. The baths are often followed by an increased flow of urine, which is commoner after shorter baths and in patients who have suffered especially from the sensation of cold. While the flow of urine is usually increased in association with albuminuria, there appears to be no constant relation between the two; either may occur without the other. There is an increase in the total elimination of solids after a cold bath, whether or not albuminuria is present, the total nitrogen and urea as well as the chlorides being increased. There is never urobilinuria.

The arterial pressure increases after baths of short duration, while following baths of longer duration there is a diminution in pressure which may last for several hours. After very prolonged baths in which the action of cold was intense there was an increase and irregularity in cardiac action, more or less diffuse cyanosis, and sometimes evident dilatation of the right heart.

Most authors have attributed the albuminuria occurring after cold baths to a stasis in the renal circulation. This view, however, is not held by the author, who believes that the phenomenon is due to the cutaneous irritation.

That albuminuria may be due to the action of the nervous system upon the renal elements without concurrent vascular changes is suggested by Berkley's demonstration of the direct relation between the terminations of the nerves of the kidney and the renal elements, as well as by the observations of Arthaud, Butten, Masius, Vanni, and Boeri, who have demonstrated the trophic action of the vagus upon the kidney.

Rem-Picci believes that the albuminuria is functional, but emphasizes the fact that while the phenomenon may have but little importance, occurring upon a single occasion after too cold or too prolonged a bath, yet if it be a daily occurrence it can scarcely fail to have, in the end, a deleterious effect upon the kidneys. Too cold baths are, therefore, inadvisable in general, and should be absolutely proscribed when there is any suspicion of latent renal lesions.

Some Rare Complications of Dysentery.—REMLINGER (*Revue de Médecine*, October 10, 1901, p. 873) states that dysentery is quite frequent among the soldiers stationed at Tunis. He reports a number of interesting and unusual complications of this disease observed among the invalided soldiers admitted to the Belvédère Hospital. Regarding the bacteriology of the cases of dysentery, the writer states that the only organisms they succeeded in isolating from the stools were the common varieties of the colon bacillus. In none of the cases was the amœba coli found.

The first case reported developed definite signs of an acute nephritis. There was marked œdema, and the urine contained considerable albumin. In addition, both of the knee-joints and ankle-joints became very painful and swollen, and there was also marked muscular pain in the lower extremities. The autopsy showed that there was an acute parenchymatous nephritis, and the writer claims that the muscular and articular pains were of dysenteric origin. The patient had no fever.

Two other cases are reported in which there was marked general anasarca without clinical evidences of any cardiac or renal involvement. There was no albuminuria. Injection of methylene blue beneath the skin indicated a deficient permeability of the renal epithelium to solids. This remarkable condition usually develops during convalescence. Notwithstanding that the cases failed to show the usual urinary changes of nephritis, the writer is inclined to the view that the anasarca is due to some inherent changes in the kidneys, owing to its yielding to the usual treatment of nephritis.

In another case the patient developed an arthritis of the right knee-joint, which became markedly distended with fluid. The whole right lower extremity subsequently became swollen, and a diagnosis of phlebitis was made clinically, although no reference is made to the condition of the veins at the autopsy. There were no marked gross changes in and about the knee-joint, and the exudate was evidently not purulent.

The occurrence of an epididymitis is noted in two cases during convalescence. In both cases gonorrhœa was excluded as a cause.

The last case recorded is an interesting one of dysentery complicated by an abscess of the spleen, which eventually ruptured, causing a general peritonitis and death. At the autopsy the spleen was found to have been almost completely disintegrated by the abscess before it ruptured.

SURGERY.

UNDER THE CHARGE OF

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Omentofixation.—MONGOUR (*Journal de Médecine de Bordeaux*, August 25, 1901) states that fixation of the omentum between the posterior abdominal wall and the parietal peritoneum is a most simple operation; vascular adhesions form, and in this way the blood of the portal vein is conveyed to the vena cava more freely than if it has to pass through the permanently obstructed blood-channels of the liver. This obstruction presents itself in venous cirrhosis of the liver, generally of an atrophic type, with endophlebitis and periphlebitis of the intrahepatic ramifications of the portal vein. When this ascites by its volume becomes an obstacle to the free movement of the lungs and heart, it is removed by abdominal puncture, but if the vascular lesion be not relieved the ascites re-forms, and punctures at frequent intervals become necessary. The operation of omentofixation was performed concurrently by Talma and Van der Meulen in 1889. Since that time the technique has been modified several times, but the original principles of the operation remain the same. As the result of the vascular adhesions the collateral circulation is formed by the anastomosis of the epigastric, abdominal subcutaneous, thoracic, and internal mammary veins with the original branches of the portal trunk. The experiments on animals with this operation have not been a success. The author has collected from the literature eighteen cases of this operation, with the following results: Death some hours or days after operation in 6 cases; not improved in 3 cases; improvement doubtful in 4 cases. Recovery from the ascites in 5 cases. This operation is a grave one, for these statistics show a mortality of 35 per cent., and it is also important to consider the five cases which have been reported as cured. In one of these cases the patient had simply an ascites of cardiac origin, while in another case it is very doubtful whether the cirrhosis was of the atrophic type. There can be no doubt that in those cases of hypertrophic cirrhosis the ascites is occasionally spontaneously absorbed. The hypertrophy is for the liver a process of defence, while in those cases of bi-venous cirrhosis it is a surgical *noli me tangere*. Clinical experience has shown that those patients with hypertrophic cirrhosis who have been operated upon have recovered, notwithstanding the operative interference, and not by reason of it. In some cases it is absolutely impossible to determine the remaining functional value of the diseased liver, and, therefore, impossible to separate the cases that are operable from those that are not. In cases of doubt an exploratory operation is indicated, and

then to proceed to omentofixation in all those cases of atrophic cirrhosis with recurring ascites, except where the patient is cachectic. It is certain that the future of those cases of cirrhosis in which all treatment is stopped is not a brilliant one, but with the operation of omentofixation it becomes even more dark, and as the least one may do for these patients is to respect the few days that remain for them to live, the author does not believe in this method of treatment.

Gangrene of the Extremity of the Left Leg during Convalescence from Pneumonia; Amputation; Recovery.—DOUILLET (*Archives de Méd. et de Pharm. Militaires*, September, 1901) reports the interesting case of a man, aged twenty-one years, who had a faint pneumonia of the right lung, and who, on the second day of the defervescence, complained of much pain in the left leg, which was soon followed by gangrene, and eventually the leg was amputated at the point of election for its relief. In order to determine the cause of the gangrene, a dissection was made of the amputated portion of the leg. This showed that the anterior tibial and peroneal arteries were not only permeable but apparently unaltered, while the posterior tibial artery was completely obliterated. The deeper veins presented no pathological changes. Without doubt the gangrene was the result of the obliteration of the posterior tibial artery, for it commenced in the portion of the leg whose blood-supply was derived from that artery. This obliteration was not due to an embolus, but was the result of an arterial thrombosis. Failure to obtain a bacteriological and microscopical examination made it impossible to determine the exact condition of the arterial tunics and the alteration of the blood by the pneumococcus or its toxins. These are factors which are competent to have played an important part in the formation of the thrombus, especially as the circulation in this patient was extremely poor not only from the onset of the pneumonia but throughout convalescence.

Notes on a Case of Acute Urethritis Due to the Staphylococcus.—MALHERBE (*Annales des Mal. des Organes Genito-Urinaires*, November, 1901) states in conclusion: 1. The urethral canal may occasionally be the seat of acute inflammation due to the staphylococcus albus. It may be obtained in pure culture on either serum or gelatin. 2. The contact of the meatus with a buccal mucous membrane affected with aphthous stomatitis may, perhaps, be a possible mode of infection. 3. This urethritis due to the staphylococcus is shown by a very slight sero-sanguineous discharge that differs in every way from the discharge of gonorrhœa. 4. There is pain on urination, and it may be more marked than in gonorrhœa. 5. The pain is severe along all the canal during urination, and there may be neuralgia and cutaneous hyperæsthesia in all the genital region. 6. It may have a duration of five weeks. Notwithstanding the violence of the local inflammation there is no effect on the general health. 7. It ceases spontaneously without treatment, and is not followed by complications. 8. It may or may not be easily contagious to women. 9. Acute staphylococcus urethritis is probably rarely seen in a marked form, but it is probable that those cases where a marked inflammation remains limited to the fossa navicularis and does not produce discharge are of this nature or due to some germ other than the gonococcus.

A Case of Traumatic Intraperitoneal Rupture of the Bladder; Laparotomy; Recovery.—DOHRN (*Deutsche Zeitschrift für Chirurgie*, July, 1901) states that up to the year 1878 out of 131 reported cases of intraperitoneal rupture of the bladder only one case recovered, while in 1896 out of 38 cases of traumatic intraperitoneal rupture of the bladder that were treated by operation 21 died. It is most important that operation be performed as soon after the accident as possible, although later an operation may be successful, as in the author's case. A man, aged forty-one years, was run over by a heavily laden wagon, which passed over the right hip and the lower portion of his abdomen. He was at once removed to his home, and complained of severe pain in the lower part of the abdominal cavity and an inability to void either urine or feces. The same evening there were nausea and vomiting. Operation was performed forty-six hours after the accident. A median incision above the pubes was made, and the extraperitoneal portion of the bladder was found uninjured. The peritoneum, which bulged, was then incised and the peritoneal cavity was found to be filled with a reddish-yellow fluid with a markedly urinous odor; flushed out; recovery.

Auto-intoxication from Intestinal Obstruction.—KUKULA (*Archiv für klin. Chirurgie*, vol. lxiii, p. 773) reports on his numerous and laborious experiments, which he instituted with the intention of determining the substance or substances which produce the large number of symptoms of prostration and collapse, in the course of intestinal obstruction whose origin cannot be explained by the mechanical impediments to the passage of the intestinal contents, and which he, in conjunction with many others, believes to be due to an auto-intoxication. In the first part of his paper he reviews the work which has been done and the literature which has been published on the subject. He divides the substances which have been isolated from the intestinal contents, and which have been claimed as causes of auto-intoxication, into two groups: Those arising during the normal process of digestion, which may, however, exist in abnormal quantities; they may be products of carbonic-acid fermentation, as acetic acid, lactic acid, butyric acid, etc., or of the putrefaction of the albumins, as NH_3, N, CO_2, H_2S, leucin, phenol, cresol, etc. To the second group belong only those chemical substances which are formed in stagnant or fermented fecal matter, for example, pyridin, chinolin, the toxalbumins, and ptomaines; of the latter, the diamins, as tetramethylene and pentamethylene diamins, and ethylene diamin, cholin, neurin, interest him especially. He deplores the fact that we know very little more than the names of these substances. The substances of the first group, when existing in normal amount only, preserve the peristaltic movements of the intestines; when in abnormal amounts peristalsis is increased, gastritis and enteritis are produced. Lactic and succinic acids are the worst of these offenders. The products of albuminous decomposition are much more toxic, however, and only rarely do they exist in the normal intestine; even small quantities of H_2S, NH_3, and phenol are eminently toxic to lower animals. The second group is much more important, however, to the question of auto-intoxication, but after reviewing everything written about it carefully, he concludes that regarding some we are

not even certain that they exist, regarding others we know no more than that they exist.

In the second part of his paper he describes his experiments, of which there were three series: In the first group, believing the symptoms to be due to toxins, he used the contents of the intestines from five cases of occlusion, injecting the filtrate into rabbits, rats, dogs, mice, and guinea-pigs. He experimented with thirty-nine animals, but by far the greater number did not react at all. Six of them died within a few days, but only one of these had typical obstruction. He believes his ill-success to have been due to too great a dilution of the material. Of nine animals in whom he produced artificial obstruction of the intestines, but one died with characteristic symptoms. Of five animals in whom he produced strangulated hernia and volvulus respectively, but one of the latter died as the result. No toxicity of the intestinal contents of these animals was found when they were injected into cats. In the second group of his experiments he attempted the production of intestinal occlusion in twelve dogs; in seven he succeeded, three others recovered, and two died of purulent peritonitis. Of the seven cases four died with characteristic symptoms within a few days, and at the autopsy the typical picture of intestinal obstruction was found. The other three were killed at the time when presenting none of the symptoms, but showing much phenol and indican in their urine. In all the cases it was noticed that these two substances increased progressively in the urine until the day of death, or, in those dogs which recovered, until the day of restitution of the intestinal function. He does not believe, however, that these substances are of great value in solving the question of autointoxication, as in no case did they exist in sufficiently large quantities to be considered toxic.

The intestinal contents from the obstruction cases were injected into dogs and cats, and produced, whether injected pure or as filtrate, characteristic symptoms of intoxication. By means of alcohol nearly all of the toxic substances could be extracted from the fecal matter, and animals injected with this extract showed the symptoms even more markedly than the others, but intraperitoneal injections were even more potent than subcutaneous. Pentamethylene diamin, sulphuretted hydrogen, and methylmercaptan are believed by Kukula to play an important part in producing the symptoms, the first, however, more than the other two, especially as in his experiments with the gases he was not very successful. Control tests with normal feces were constantly made, but were found only slightly toxic, and then only for a short time. In the third series he used the intestinal contents of four cases of obstruction, and of one normal individual (the latter for control purposes), injecting them into thirty animals, with the same results as in series two. The symptoms thus produced are considered by him to be identical with the symptoms of intestinal obstruction in man, and as the same substances produce them in both instances, he considers them due to an absorption of the septic materials through the coats of the intestine, the epithelium of which is affected very early in the course of the obstruction. He believes these septic substances to be, in part, gases, in part products insoluble in water (pentamethylene diamin), but he is not able to definitely state the exact causes of auto-intoxication.

THERAPEUTICS.

UNDER THE CHARGE OF

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Therapeutic Value of Adrenalin Chloride.— DR. D. S. REYNOLDS, in a series of observations on diseases of the eye, concludes that: 1. It is a powerful hæmostatic and acts promptly, generally within one minute from the time it is applied to mucous surfaces. 2. Its effects persist from twenty minutes to four hours. 3. It promptly relieves ciliary pain in all forms of keratitis, iritis, and even cyclitis of glaucoma. 4. It reduces ocular tension in glaucoma, and apparently prevents hemorrhage in iridectomy. 5. It promptly clears up interstitial opacities of the cornea following contusions, and seems to modify favorably the opacities of punctate keratitis in cases of syphilitic iritis. 6. It will, in many cases, so reduce the swelling in the tear passage as to allow a stream of fluid to pass from an Anel syringe through the duct without the aid of a probe. In a great variety of tinnitus aurium prompt and sometimes lasting benefit follows the introduction of a drop of adrenalin solution through the Eustachian catheter, blown into the tympanic cavity. 7. In all forms of swelling in the lining of the nose prompt relief follows the application of four or five minims of adrenalin solution sprayed into the passage. Operations in nasal sinuses are rendered bloodless. One to one thousand solution of adrenalin in sodium chloride may be relied on to check epistaxis.—*American Medicine*, 1901, vol. ii., p. 32.

Action of Caffeine on the Mammalian Heart.—DRS. ARTHUR R. CUSHNY and BERT K. VAN NATEN have made a careful study of this subject, being led to make the investigation by reason of the few direct observations which had been recorded of the action of this alkaloid on the heart of mammals, and because of the frequent use made of caffeine in the therapeutics of heart disease. They find that the effect of caffeine on the dog's heart appears to consist in (1) an acceleration of the rhythm without further change; (2) a shortening of the movements, commencing in the auricle and spreading to the ventricle, and, in large doses, (3) auriculo-ventricular arrhythmia terminating in the fibrillary contractions of the auricle and finally of the ventricle. The first phenomenon—the acceleration—appears to be due to stimulation of the most irritable part of the heart, the so-called excito-motor apparatus, and as no further change in the movements is seen, the action of the drug at this stage appears to be confined to this area. The second change, the lessened excursion of the levers, may be due in part to the acceleration, and may thus be considered a secondary effect of the

increased irritability of the excito-motor area; but it may also be ascribed to the action of the drug on the muscle of the auricle and ventricle, and may thus indicate that the influence of the drug has extended to these less susceptible parts of the heart. The third stage of arrhythmia is due to the ventricular irritability having been so greatly increased as to give rise to an idioventricular rhythm. The interference of the two rhythms then explains the major part of the variation in the strength of systole and the extent of diastole. The idioventricular rhythm indicates that the characteristic stimulant action on the cardiac muscle has extended to the ventricle. When this has attained a sufficient height it leads to fibrillary contractions in the ventricle; the previous appearance of these in the auricle appears to indicate that the stimulant influence spreads to this before it reaches the ventricle. The action of caffeine on the mammalian heart thus appears to consist in a descending stimulation which begins in the excito-motor area at the junction of the auricle and great veins, and extends into the auricles and finally to the ventricles. The effects can be explained by direct action on the muscle without the necessity of appealing to any nervous apparatus, and their experiments do not support the idea that the nervous apparatus of the heart is involved in the effects. If the action of caffeine on the dog's heart be compared with that of the digitalis series it is found that, as far as the direct action on the heart is concerned, they resemble each other in both, affecting only the heart muscle. But in the case of digitalis, the earliest changes seen are in the strength of systole and extent of diastole in the ventricle and auricle. These parts of the heart are thus affected sooner than the excito-motor area, and the contrast between the action of the two drugs may be explained by stating that while both act on the heart muscle the stimulation exercised by caffeine begins in the excito-motor area and descends to the auricle and then to the ventricle, and its effects on the rhythm (as far as these are caused by direct action on the heart) are of secondary importance. Further, the primary changes induced by the digitalis series are not so much evidenced by increased irritability of the parts affected as by increased contractility and lessened dilatation (increased tone), while there is no evidence of such a change in the late stages of caffeine poisoning, in which the ventricle is directly affected.—*Archives Internationales de Pharmacodynamie et de Thérapie*, 1901, vol. ix., p. 12.

The Mechanism of the Action of Igazol.—Dr. V. Cervello has been investigating the therapeutic possibilities of a combination of formic aldehyde and chloral hydrate with terpine and iodoform, known as igazol. He has found that this product has a distinct value, used as an inhalant in the therapy of tuberculosis, and in the present study seeks to find some rational explanation for the good clinical results obtained. The early investigations on rats, rabbits, guinea-pigs, etc., demonstrated that, exposed to an atmosphere impregnated with this combination, the respiratory functions showed a marked alteration that consisted primarily in a much heightened excursion of the respiratory curve, *i. e.*, the amount of respiratory exchange was greatly increased. This did not seem to be an irritative phenomenon, since with the increase in the amplitude of the thoracic vibration there resulted a slight diminution in the frequency of the breathing. The investigator further

claims to have shown that this substance excites the organic tissues to fix and to consume larger quantities of oxygen than under normal conditions. This oxidizing energy is largely resident in the blood, but does not alter the character of the hæmoglobin. This blood action is very characteristic and brings out the results of Tollens along this same line, that formic aldehyde is a powerful blood oxidizing and reducing agent.—*Archives Internationales de Pharmacodynamie et de Thérapie*, 1901, vol. ix., p. 217.

Treatment of Gastric Ulcer.—DR. A. ROBIN gives in very succinct form the following general directions for the treatment of this affection. The first indication is functional rest. Formerly the milk treatment was instituted immediately the existence of gastric ulcer was recognized; but the experience acquired by him in the treatment of this malady as well as the results obtained by Fournier and Gros during the last few years have demonstrated the necessity of putting the patient through a preparatory course of treatment, consisting of absolute rest, before adopting the milk diet. The following is the course of treatment: The patient is kept in bed; a towel steeped in hot water and covered with oiled silk and cotton-wool is placed over the epigastrium, and kept in position by means of a flannel bandage; no nourishment being given by the mouth, not even milk or water. The patient is given four enemata daily, each composed of two eggs beaten up with two spoonfuls of peptone, thirty grains of salt, a few drops of laudanum, and three ounces of glucose (20 per cent.). The whole enema should measure about six fluidounces. Two other enemata of simple warm water are given during the day to supply the organism with the necessary amount of liquid. To accustom the patients to this treatment it is well to increase the number of enemata gradually until complete tolerance is obtained. Where intolerance is present (which happens in about one in fifteen cases, according to his experience) one must endeavor to overcome it by increasing the laudanum to twelve or fifteen drops, or by suppressing the salt and the peptone, which seem to be the substances which usually provoke the intolerance. According to Fournier and Gros, the treatment should be continued for two weeks, and in some cases for a month, but Robin has never found it necessary to prolong the period of absolute rest beyond twelve days at the most, and frequently three or four days have proved sufficient. The indications for the termination of the rest cure are persistent rectal intolerance, progressive enfeeblement of the patient, and when, in spite of the treatment, the cardinal symptoms of the ulcer persist. It need only be mentioned that the alternative for the rectal method of introducing food, viz., the subcutaneous method, a suggestion which gave rise to a highly instructive debate at the recent Congress held in Paris, the conclusions arrived at were that the subcutaneous method was impracticable and frequently gave rise to untoward symptoms. Under the influence of the rest cure the distressing symptoms subside, and the loss of weight is checked. When the milk diet is begun the patient should take gradually increasing quantities until the daily amount reaches four quarts. This should be maintained for not less than six months, when a mixed diet may be ordered consisting of milk foods prepared with tapioca, arrowroot, rice, etc., with the addition of a few vegetables. After about two weeks the milk

is abandoned entirely, and the patient is allowed meats, fish, eggs, vegetables and cooked fruits. A certain proportion of patients, however, will require a supplementary treatment, these usually being such as show indications of neurasthenia and those who suffer from anemia. For the former the preparations of arsenic, more particularly sodium cacodylate subcutaneously, are advisable; and for the latter iron, preferably the perchloride, is the best medicine. In administering sodium cacodylate subcutaneously the best results have been obtained by the use of one grain daily for eight consecutive days, followed by an equal number of days of repose, and continued until the administration has covered forty days. This method of treatment has given excellent results in grave cases of cachexia. Various other methods of treating gastric ulcer have been tried, such as the introduction of bismuth subnitrate into the stomach, when after contact with the ulcer it is siphoned out; also the suggested washings of the stomach with a solution of silver nitrate, and with iron perchloride, none of which methods can be recommended, since the introduction of the tube in such cases is always more or less dangerous.—*Medical Press*, 1901, vol. cxxiii., p. 457.

[The introduction of the stomach-tube by experienced hands is nearly devoid of danger. Magnesia ponderosa by the mouth certainly facilitates healing and apparently does not irritate.—R. W. W.]

The Kidneys with Reference to the Employment of Diuretics.—Dr. A. R. Elliott says that with the exception of the irritant epithelial diuretics (turpentine, cantharides, etc.) the entire class may be said to exert their effect on the urine by acting indirectly through the circulation. Because of the necessity of avoiding all irritation of the kidneys, diuretics should act indirectly rather than directly; consequently, the secretory diuretics are contra-indicated in irritative and inflammatory renal conditions, and the simple diluents and salines are best adapted, since diuretics are mainly useful in overcoming concentration and hyperacidity of the urine. In an acute nephritis saline diuretics are permissible throughout the entire course of the disease, and exert a beneficial influence by increasing elimination and clearing the tubules of inflammatory *débris*. Subcutaneous saline infusion constitutes a most powerful aid to elimination in desperate cases. In chronic nephritis the cardiovascular diuretics are most useful, owing to the fact that oliguria and dropsy are usually the result of circulatory failure; and the dropsy, being of cardiac origin, may be benefited by cardiovascular stimulants, provided the kidneys are not too badly damaged. Dropsy of purely renal origin, however, is not amenable to favorable influence by diuretics. Although the morbid process in the kidneys may furnish us with our primary inspiration to diuretics, it is the condition of the heart and circulatory apparatus in most cases that determines the choice of an agent.—*Medical News*, 1901, vol. lxxix., p. 201.

Treatment of Rheumatism and Allied Disorders.—Dr. D. K. Coverly, writing of the treatment of rheumatism by the salicylates, says that the value of this medication has been materially lessened by the many drawbacks which its constant administration entails; the more prominent of these being headache, tinnitus, cardiac depression, and complete anorexia,

with subsequent gastric irritation. The urgency of these symptoms necessitates a suspension of the treatment, and the ground thus periodically lost accounts for the tardiness of the recovery. In consequence of this many attempts have been made, with more or less success, to replace the salicylates with compounds for which was claimed freedom from all objectionable features; but for some time these did not substantiate the claims made for them. Recently the introduction of salophen seems to have accomplished the purpose, since this drug possesses no irritating effects and is well borne by the stomach. It passes unchanged into the intestines, and is there decomposed into salicylic acid and paramidophenol; both of these contributing to its therapeutic action as an antirheumatic, antipyretic, and analgesic; but its efficiency as an antirheumatic is less pronounced because of the comparatively small amount of salicylic acid set free, though as an antipyretic and analgesic it remains a valuable remedy. Of still more recent appearance is aspirin, which chemically is acetyl salicylic acid, and occurs in crystals which are soluble in alcohol but not in water. In marked contrast to salicylic acid, this drug is agreeable in taste, slightly acidulous, and does not give rise to digestive disturbances. In the stomach it remains unchanged; but when brought into contact with the alkaline secretion of the intestines, salicylic acid is gradually liberated. After absorption not only does it act therapeutically as an antirheumatic, but as an analgesic and antipyretic as well, and its prompt elimination is readily accounted for by profuse sweats and increased action of the kidneys—*Therapeutic Gazette*, 1901, No. 11, p. 729.

Sodium Silicate, Sodium Fluorsilicate, and Sodium Fluoride in Therapeutics.—Dr. Alfred Siegfried has given a thorough *résumé* of the occurrence, physiological action, and therapeutic indications of silicon sodium salts and their closely related fluorides. He shows that of late years almost nothing has been done with these bodies, and that many of the experimental results obtained by pharmacologists twenty-five years ago, and which are widely quoted at the present time, especially concerning toxicology, are not in accord with the facts.

The following pharmacotherapeutic indications are brought out: It is logical and of great value to use sodium silicate in acid poisoning. It is to be preferred to any alkali which develops carbon dioxide gas, and, moreover, has the advantage of coating the mucous membrane with a protective mucilage-like coat. In excessive acidity of the stomach it can be used in the proportion of one of sodium silicate to one thousand of carbonic acid water, as a table water. In acid diabetes it is useful as a table water. In gout it is especially valuable. In all of these diseases an alkaline salt is preferable, although a neutral salt is not contraindicated. It may be useful in hyperkeratosis or in lack of development of the horny layers of the skin. An extremely suggestive line is that of its use in phthisis. Inasmuch as fibroid phthisis offers the best prognosis of any of the forms of this disease, it is suggested that the use of sodium silicate may help in bringing about a certain increase in the silicious matter of the lung, and thus aid in the development and resistance of the fibrous tissue. This is in line with the widely believed idea that calcareous waters aid in bringing about a precisely

similar condition, *i. e.*, chalky deposits and fibroid changes. Kobert in his work at the Görbersdorf Tuberculosis Sanitarium investigated the subject for over one year, and while not arriving at any convincingly positive conclusions, yet demonstrated that daily doses of fifteen to thirty grains of sodium silicate can be taken without any harm. His completed results await publication. So far as the fluorine compounds are concerned, recently antitussin for whooping-cough has been warmly recommended, and acute pneumonia has been treated with fluoroform. Further therapeutic possibilities may exist for the use of the fluorine compounds in aiding in the development of the teeth and in rhachitis.—*Archives Internationales de Pharmacodynamie et de Thérapie*, 1901, vol. ix., p. 225.

Treatment of Syphilis by Injections of Succinimide of Mercury.—Dr. M. Horovitz strongly recommends the use of this form of mercury for the treatment of syphilis. He employs it in a mixture with cocaine according to the following prescription: Mercury succinimide, 5; cocaine hydrochlorate, 2; distilled water, 100. The mixture has the following advantages: because of the addition of the cocaine no pain is felt, it works rapidly, does not produce any swelling, because of its high percentage of mercury its action is very energetic, and the dosage can be accurately measured.—*Centralblatt für die gesammte Therapie*, 1901, vol. xix., p. 641.

GYNECOLOGY.

UNDER THE CHARGE OF

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Appendicitis in Connection with Pelvic Disease.—Fraenkel (*Centralblatt für Gynäkologie*, 1901, No. 40) believes that it is time to abandon the popular view that appendicitis is peculiar to the male sex. Infection may extend to the appendix from the diseased pelvic organs, or *vice versa*, in two ways, viz.: By an intraperitoneal route along the bloodvessels and lymph vessels of the suspensory ligament of the ovary (*ligamentum appendicula ovaricum*), or by direct contact of an abnormally long appendix with the uterus or right tube and ovary, or fixation of the adnexa at the pelvic brim; by an extraperitoneal route between the folds of the mesocæcum, or in consequence of the extraperitoneal development of the cæcum and appendix.

The most frequent pelvic complication of appendicitis is suppurative inflammation of the tubes and ovaries, especially on the right side. Rarely an abnormally long appendix may be found on the left side of the pelvis. The fact that torsion of the pedicle in cysts of the ovary and parovarium is often noted in connection with appendicial trouble may be explained by the increased intra-abdominal pressure and peristalsis accompanying peri-

typhlitis. Since acute inflammation confined to the right tube and ovary is comparatively rare, when this condition is associated with appendicitis a direct causal relation must be inferred, especially in young subjects with right-sided pyosalpinx or "idiopathic parametritis, when gonorrhœal or tubercular infection can be positively excluded and there is no history of a previous acute vaginitis.

The writer does not accept Edebohls' theory of the causal relation between movable kidney, chronic appendicitis, and right adnexal diseases, and believes that the palpation of slight enlargement of the appendix is an uncertain means of diagnosis, and that statistics with reference to the relative frequency of associated adnexal and appendicial disease based upon this sign are open to grave error. Repeated attacks of localized pain, with occasional elevations of temperature just before or during menstruation, accompanied by gastro-intestinal disturbance, should direct attention to the appendix, and, after other means of relief have failed, furnish an indication for appendectomy.

In every case of appendicitis in the female a thorough examination of the pelvis should be made, preferably under anæsthesia, in order to avoid errors. The appendix should be examined in every case of abdominal section for pelvic disease, and should be removed not only when it is manifestly diseased, but even when it is adherent, since if it is spared the adhesions generally re-form, and morbid changes are apt to occur in the muscular wall of the appendix in consequence. On the other hand, during the course of an appendectomy the conditions of the uterus and adnexa should be noted.

When an appendicial complication of adnexal disease is suspected the abdominal is preferable to the vaginal route. The right tube and ovary can be reached through the classical incision in the flank, but if both ovaries and tubes are affected the median is better.

Deep-seated abscesses may be drained per vaginam, or through the rectum in children and virgins; if situated too high up to be reached from below the pus may be evacuated through an abdominal incision, the diseased appendix and adnexa being removed subsequently.

Operation for Complicated Vesicovaginal Fistula.—WOLKOWITSCH (*Centralblatt für Gynäkologie*, 1901, No. 43) reports eight cases which he operated upon successfully by the following method: The cicatricial tissue around the opening is first dissected away; then the cervix uteri is freed and drawn downward, if possible without opening the peritoneal cavity, although this cannot always be avoided. All cicatricial bands are divided until the uterus can be drawn down almost to the vulva. The hemorrhage is not profuse, and it is important not to ligate the uterine arteries. A wide denudation of the vaginal mucosa is made around the edge of the fistula, the anterior surface of the cervix is completely denuded, and the raw surfaces are brought in contact by silk sutures. It is seldom necessary to suture the edges of the vesical mucosa separately. The vagina is then tamponed with iodoform gauze. If the peritoneal cavity has been previously opened a drain is introduced.

In order to drain the bladder thoroughly a suprapubic opening is made sufficiently large to admit the introduction of a small rubber tube, which is

sutured to the edges of the bladder wound. Drainage is favored by allowing the patient to lie on his belly, another larger tube being attached to it and leading to a receptacle, in order to prevent soiling the bed. The writer in recent cases has omitted the suprapubic drainage, with equally good results.

In the eight reported cases the functions of the bladder were completely restored, while there were no disturbances caused by fixation of the cervix to the anterior vaginal wall.

Vaginal Incision in Pelvic Abscess.—BÜRGER (*Centralblatt für Gynäkologie*, 1901, No. 43) reports 273 cases of pelvic abscess, including only those of suppuration of the tube and ovary. He emphasizes the fact that in pyosalpinx the conditions are essentially different from those which are present in ordinary abscesses, since even after evacuating the pus the diseased mucosa remain as a source of fresh infection and renewed suppuration. Hence the indications for incising pus-tubes per vaginam are comparatively limited. Of these fever is the most important, as it shows the presence of an acute process, with fresh pus, the escape of which into the peritoneal cavity during laparotomy is often fatal to the patient. Excessive tension of the sac and threatening perforation into adjacent organs are other indications for incision, which, however, is to be regarded simply as a palliative measure, to be followed later by abdominal section if necessary. When it is impossible to remove the pus by incision alone the diseased tube may be extirpated per vaginam.

In analyzing his cases the writer finds that in a considerable proportion it was necessary to repeat the operation in consequence of fresh suppuration in the opposite tube or imperfect drainage of the abscess cavity.

The results were seldom permanent, as the local pains usually persisted or were aggravated. A radical operation was necessary in 25 per cent. of the cases. In short, vaginal incision is to be regarded merely as a safe and easy way of temporarily relieving the patient from the symptoms incident to retained pus and of postponing the radical operation until it can be performed with less danger of infecting the healthy peritoneum.

Cancer of the Fallopian Tubes.—KNAUER (*Centralblatt für Gynäkologie*, 1901, No. 43) reports a case of adenocarcinoma involving both tubes and ovaries. He regarded the disease as developing primarily in the tubes, for the following reasons: The ovarian tumors presented the same structures as the tubal. Only portions of the ovarian stroma were affected, the cancer cells having invaded the normal tissue in different places, while in no instance was the germ or follicular epithelium involved.

The writer calls attention to the fact that while only four cases of cancer of both tubes have been reported, the simultaneous occurrence of the disease in both tubes and ovaries has not previously been noted.

Treatment of Adherent Retroflexion.—DIETEL (*Centralblatt für Gynäkologie*, 1901, No. 28) reports 112 cases, in 88 of which the displacement was of long standing. He employed massage and replacement under narcosis as well as surgical treatment. In 32 cases treated by massage 9 were successful. Of 23 in which Schultze's method was employed 20 patients were relieved so that they could wear pessaries, but in these the adnexæ were not

adherent; 21 cases with adnexal complications were similarly treated, but only 12 were successful; 25 patients only were operated upon, the abdominal route being adopted by preference, with conservative treatment of the tubes and ovaries, 22 patients being cured. Hysterectomy was not performed in any instance.

Posterior Vaginal Enterocele.—GONILLOND (*Revue de Chirurgie*, 1901, No. 5) performed posterior colporrhaphy and ventrofixation for the cure of complete procidentia in a woman, aged forty years. Two months later a vaginal enterocele developed, the uterus remaining in normal position. The posterior vaginal fornix was opened, and the peritoneal sac was extirpated as in an ordinary hernia, after which the cervix was amputated, with a successful result.

These cases are quite rare. Condamin reports one in which an enterocele developed as the result of coughing, the pelvic floor being intact, and the uterus, rectum, and bladder being in normal position.

Chloroform Narcosis.—BONREAU (*Revue de Chirurgie*, 1901, No. 5) reports 1200 cases without a death. He uses a folded handkerchief, the chloroform being administered drop by drop, plenty of air being given at first. The tongue is drawn forward. Narcosis was usually complete in from eight to ten minutes.

Renal and cardiac diseases were not regarded as contraindications. Trendelenburg's position, the writer believes, is of advantage in chloroform anæsthesia. In twelve cases syncope occurred, and it was necessary to resort to artificial respiration.

Perforation of the Uterus.—REYBREYEND (*Revue de Gyn. et de Chir. Abdom.*, 1901, No. 2) includes under this heading accidental puncture of the gravid and non-gravid uterus, either with or without previous laparotomy. Cases of perforation with the sound or curette are not considered. In the former class of cases it is necessary to give a cautious prognosis, since abortion may occur after a considerable lapse of time.

Perforation of the uterus during vaginal operations occurs most frequently while enucleating sessile submucous fibroids.

With modern aseptic methods, less anxiety need be entertained about the result of this accident than formerly. Simple puncture requires no treatment. A considerable wound should be sutured at once after opening the abdomen. Hysterectomy is seldom necessary.

Chorio-epithelioma of the Uterus.—HITSCHMANN (*Centralblatt für Gynäkologie*, 1901, No. 28) reports the case of a multipara, aged thirty-eight years, who missed one period and began to have hemorrhages soon after, which continued for three months without symptoms of pregnancy. On examination the uterus was found to be enlarged, and that a tumor presented at the os internum. Examination of fragments showed that it was a chorio-epithelioma, whereupon the uterus was extirpated, death resulting three weeks later from metastasis in the thoracic and abdominal viscus, as well as in the brain. Microscopically the syncytium was slightly defined, there being isolated giant cells or delicate striæ.

OBSTETRICS.

UNDER THE CHARGE OF

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Two Cases of Idiopathic Swelling of the Parotid Gland in Newborn Infants.—KIEN (*Zeitschrift für Geburtshülfe und Gynäkologie*, 1901, Band xlvi., Heft 2) reports the case of a child born after spontaneous labor, and fully developed. The cranium showed no depression of its bones; the sutures and fontanelles were normal; the face showed an extraordinary appearance, caused by the swelling of the parotid glands. Examination showed that the submaxillaries were not involved; there was no abnormality in the mouth, nor was any infection in the mouth present. Steno's duct was patulous, and saliva escaped freely. The hands were somewhat swollen and cyanotic. The child's mother was normally shaped and healthy, and had already had three children, each of whom was healthy. The mother believed that the condition of her child was the result of a fright which occurred in the early months of her pregnancy. She had seen upon the street a child having a greatly deformed face. Four weeks after birth the swelling had very much diminished.

Madelung and Freund narrated to the writer a case coming under their observation of a similar nature. A review of the literature of the subject shows that some of these cases have been found to be sarcomatous, and in some Steno's duct was occluded.

The Treatment of Repeated Abortion and Premature Labor, with Fœtal Death.—LOMER (*Zeitschrift für Geburtshülfe und Gynäkologie*, 1901, Band xlvi., Heft 2) reports twenty-one cases of abortion and premature labor, with death of the embryo or fœtus. These were treated by prolonged rest in bed and by the administration of iodide of potassium and iron throughout the entire pregnancy. His cases may be divided into three classes: one, syphilitic, in which the syphilis was old or hereditary; the second class, in which the kidneys were very deficient in action and the patient was threatened with nephritis; and the third class, in which the patient was constantly absorbing necrotic material from a chronic endometritis. He believes that the treatment acts by preventing the rupture of vessels in the placenta. He also lays much stress upon the chronic anæmia present in these cases, for which he uses iron.

Cæsarean Section and Forceps Delivery in the Same Patient.—In the *Dublin Journal of Medical Science*, October, 1901, KIDD reports the following case: The patient was pregnant when first seen, and had a hard growth spring-

ing from the body of the cervix. This was apparently a fibroid, and extended toward the promontory of the sacrum. The head of the child was pushed aside to the ramus of the pubes on the left side. The tumor could not be dislocated, and accordingly Cæsarean section was performed and the child delivered in a semi-asphyxiated condition. On the evening of the third day the child had slight convulsions, and vomited blood and died Upon autopsy, hemorrhage from the œsophagus and upper portion of the stomach was present. The mother made a good recovery from the operation. The patient was examined on convalescence, and it was found that the tumor had descended with the uterus and filled the hollow of the sacrum. The patient left the hospital with instructions to return should pain or disability occur or should she become pregnant.

She did not report for several months, until she applied for assistance in labor. On examination the membranes had ruptured, and the tumor acted as a wedge and prevented the descent of the head. The posterior wall of the uterus was drawn strongly upward, but it seemed possible that the head could come down between the tumor and the sacrum. Accordingly the patient was anæsthetized and was delivered with forceps. The placenta was adherent very firmly and removed with difficulty. The patient made a good recovery.

It is interesting to note that the uterus, which had been very carefully closed at the Cæsarean operation, had successfully endured the strain of seventy-three hours' labor. If an explanation is sought for the successful forceps delivery it must be found in the fact that the tumor had undergone involution with the uterus, and had not essentially enlarged during the second pregnancy.

Prophylactic Perineotomy during Labor.—MANDELBERG (*Centralblatt für Gynäkologie*, 1901, No. 46) describes sixty-six perineotomies performed during labor in one of the maternity hospitals of St. Petersburg. Of the sixty-six patients sixty-two were primiparæ. The incision was made with a knife, in the central line, through the frænulum, extending from 2½ to 3 cm. The lower extremity of the incision terminated in front of the sphincter of the bowel. The cut was made during a pain. After the uterus was emptied the incision was closed under anæsthesia. It is claimed for this method that it prevents more extensive and serious tear, that union is better, that it diminishes the resistance to the head at the latter part of labor, that it prevents stretching of the uterine ligaments, and that it is in every way preferable to resistance to the head and to tear of the pelvic floor extending in several directions.

[There is much to be said in favor of this procedure. Some of the worst tears of the perineum and pelvic floor occur because the attendant makes injurious endeavors to protect the parts. During labor no pressure should be made upon the perineum proper, and the edge of the hand which supports the parts should cover the anus, but should not extend higher upon the perineum. The perineum should be left free to dilate as the head emerges.

The progress of the head should be regulated by the other hand of the attendant. Nature usually performs the operation described by Mandelberg. If no undue resistance is made to the exit of the fœtal head the tear is

usually in the median line, is readily closed by suture, and heals without difficulty.

In our experience it is seldom necessary to cut the perineum, but it is better to allow a moderate tear in the perineum than, by our efforts to prevent it, bring about a manifold tear in the pelvic floor and vagina.]

A Case of Duchenne's Paralysis.—STOLPER (*Monatsschrift für Geburtshülfe und Gynäkologie*, Band xiv., Heft 1) reports the case of a multipara in labor, with the child in vertex presentation, second position, and with the head transverse in the cavity of the pelvis. The child was delivered by forceps, and it was necessary to extract the shoulders by pulling upon the occiput and the chin. As the shoulders were very broad, this was difficult, and required strong traction, with marked internal rotation. The fingers could be spontaneously moved. Except a small pressure-mark on the forehead there was no sign of injury. The arm was examined by the Röntgen rays, and no separation of the bones was found. The muscles involved in paralysis were the deltoid, biceps, brachialis internus, infraspinatus, and supinator longus.

Paralysis of the brachial plexus with the use of forceps occurs most frequently where flexion is wanting, and especially in face presentation. If the arm is strongly thrown upward and backward, traction upon the clavicle may produce the same result. In this case the roots of the fifth and sixth cervical nerves are pressed against the vertebræ. A similar pressure is made when the child is extracted by traction upon the head, with strong pressure upon the shoulders. In no case have the roots of the nerves been ruptured.

The prognosis is sometimes uncertain. It is best after cases following the use of forceps, and is not absolutely hopeless where traction has been made upon the clavicle. The treatment consists in the use of electricity and massage.

Deciduoma Malignum.—WINKLER (*Zeitschrift für Geburtshülfe und Gynäkologie*, 1901, Band xlvi., Heft 2) reports the case of a woman, aged thirty-three years, who had had three normal pregnancies and labors. The last labor was four years before coming under observation. For the last four months she had had irregular hemorrhages and pain in the lower abdomen. She described a bladder-like body as having been expelled. She gave no typical history of abortion. On examination a tumor extending to the left side was felt above the symphysis pubis about the size of a child's head. It evidently was the enlarged uterus. On the left side, underneath the navel and on the left side of the vulva, there was a portion of tissue which gave indistinct fluctuation. The cervix was enlarged and soft, and the external os permitted insertion of the finger. The urine showed the presence of pus, epithelia, and a small quantity of albumin. A diagnosis was made of deciduoma with metastases, and hence inoperable. The patient shortly afterward died.

Upon autopsy the uterus was found gangrenous at the fundus, and a portion of the growth had involved the sigmoid flexure of the colon. Metastases were also present in the lungs and in the kidneys.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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Periscopic Lenses.—PERCIVAL, Newcastle-on-Tyne (*Archives of Ophthalmology*, 1901, No. 5), gives formulæ for the radii of curvature of the surfaces of periscopic lenses. Periscopic lenses enable the wearer to see more clearly when moving his eyes from side to side—a manifest advantage. The side next to the eye must be always concave. The following table gives the radii of curvature for some periscopic lenses when the refractive index of the glass is 1.54; r_2 is the radius of curvature in mm. of the surface next the eye (always concave); r_1 is the radius of curvature of the surface toward the light, away from the eye. The minus sign prefixed signifies that the surface before whose radius it is placed is concave toward the eye or convex to the light; the plus sign indicates the opposite, *i. e.*, that the surface is convex toward the eye. It will be seen from the tables that the side toward the light is concave toward the eye in all except four cases, those being concave or divergent lenses.

CONCAVE PERISCOPIC GLASSES.

Power.	r_1	r_2
— 20 D . . .	+ 172.8 mm.	— 32 mm.
— 17 D . . .	+ 1512 "	$-32\frac{104}{233}$ mm.
— 15 D . . .	— 612 "	— 34 mm.
— 13 D . . .	+ 1512 "	$-42\frac{43}{59}$ mm.
— 10 D . . .	+ 1512 "	— 56 mm.
— 8 D . . .	— 843.75 "	— 62.5 mm.
— 5 D . . .	$-174\frac{6}{31}$ "	$-66\frac{2}{3}$ "
— 2 D . . .	— 102 "	$-74\frac{1}{31}$ "

CONVEX PERISCOPIC LENSES.

Power.	r_1	r_2
+ 20 D . . .	$-17\frac{41}{77}$ mm.	— 50 mm.
+ 15 D . . .	— 20 "	— 45 "
+ 12 D . . .	— 22.5 "	— 45 "
+ 10 D . . .	$-24\frac{6}{11}$ "	— 45 "
+ 8 D . . .	— 30 "	— 54 "
+ 6.5 D . .	— 37.5 "	$-68\frac{26}{79}$ mm.
+ 5 D . . .	— 54 "	— 108 mm.
+ 2 D . . .	$-64\frac{4}{59}$ "	— 84 "

Considerations of the periscopic effect will determine how to correct a given case of mixed astigmatism. For example, suppose the vertical meridian

to be −2.5 and the horizontal +2.5. This can be corrected either with +2.50 sph.⊂ −5 cy. ax. 180 or −2.50 sph.⊂ +5 cy. ax. 90. Clearly the latter will allow greater lateral range, the concave surface being next to the eye. If the vertical field should be the more important, which would be very unusual, the first formula is to be used. In compound astigmatism a concave spherical surface must be on one side, in which case the requisite toric or compound astigmatic surface is to be ground on the other. This adds very materially to the expense.

[The same author remarks in a paper published elsewhere that the glasses commonly sold as periscopic are hardly worthy of the name.]

Monolateral Innervation of the Occipitofrontalis in a Case of Complete Bilateral Paralysis of the Oculomotor Nerves.—SALOMONSOHN (*Berlin. klin. Wochenschrift*, 1901, No. 26) reports the case of a man, aged forty-nine years, without distinct specific history, but given to the abuse of alcohol, who began to have double images April of last year, with pain starting in the left eye. No definite diagnosis was then possible, although both pupils, moderately dilated (4 mm.), were insensitive to light. Decided though slight reaction to convergence, especially on the left side, was present. Accommodation on both sides paretic. Visual acuity, fields and ophthalmoscopic appearances continued normal throughout. Two weeks later there developed a typical total paralysis of the left oculomotor nerve (complete ptosis, external strabismus, eyeball movable only by the external rectus, and rotation by the trochlearis). The patient was elsewhere subjected to five weeks' inunction treatment with gray ointment without the slightest result. In the beginning of August the right eye was found to be affected with paralysis of the internal, inferior, and superior recti, paresis of the inferior oblique, beginning ptosis, complete bilateral paralysis of accommodation. The paralysis of the oculomotor soon became total on this side also. Pupils absolutely fixed (convergence no longer possible). On both sides slight exophthalmus paralyticus. Condition thus far unimproved by potassium iodide. The patient complained of a permanent dull feeling in the face without objective signs of trigeminus involvement. Sense of taste for all substances abolished. Everything tasted disgustingly sweet, even when the various substances were diffused in the mouth and not permitted to touch the tongue only—solutions of salt, sugar, acetic acid, quinine. Marked disturbance of the olfactory nerve. Ol. terebinth., ol. menth. pip., ol. caryoph., tr. asafœt. not distinguished. Sal. ammoniac at once recognized in consequence of the irritation of the trigeminus. Gait, as to be expected, uncertain, but not ataxic. No swaying upon closure of the eyes. Patellar reflex present. No tremor of the hands. Tongue protruded straight. No disturbances of speech or deglutition. Facial nerves normal on both sides. Internal organs healthy, urine normal. Latterly the patient complains of headache, presents psychical changes, is often absent-minded, and forgets what he wants to do. Remembers the past well, but not recent events, and makes strange mistakes.

The writer remarks that great care is to be exercised in making an anaomical diagnosis in such cases, seeing that autopsies have shown various anatomical possibilities with the same clinical phenomena. For not only

have progressive palsies of the cerebral nerves been observed without any anatomical lesion (Eisenlohr, Oppenheimer), but they have also been occasioned by peripheral neuritic processes, basal neoplasms of various kinds, disturbances of the nuclei, degeneration of the nerve tracts by sclerotic foci in the course of the intermedullary nerve roots, and, lastly, in a combination of such processes. By far the most frequent cause of double palsy of the oculomotor nerves, especially in syphilis, is involvement of the nerves at the base ; the involvement of the olfactory points the same way in the case reported. On the other hand, lues is quite uncertain in this case. The former abuse of alcohol may be a concurrent cause. The total palsy of the taste introduces a disturbing element. If we agree with Mauthner, the fact of binocular pupillary fixation and paresis of the accommodation already noted in April, is decisive for the diagnosis of nuclear palsy, for at that time a pure almost perfect ophthalmoplegia interna was present on the right side. The absence also of marked general cerebral phenomena and disturbance of the intellect likewise speaks loudly for the involvement of the nuclei (Mauthner). According to Bernheimer, however, the fibres of the oculomotor remain separate, extra nuclear to their exit from the brain, so that ophthalmoplegia interna does not with absolute certainty establish the diagnosis of nuclear palsy. Considering Wesphal-Siemerling's observations this case seems most likely to be a combination of nuclei and nerve degeneration.

A certain prognosis is hardly to be made. The present condition reminds one of Heinrich Heine's malady ; but whether, as in the case of the poet, progressive muscular atrophy is to follow or whether the present palsies are the antecedents of a psychosis, as is often observed, and which are to be feared from the psychical changes which have lately arisen, or whether the process, whatever may be its nature, will extend to neighboring nuclear or nerve regions, or whether it can be arrested by potassium iodide—all this is beyond our ken.

Attention is called to a striking symptom, viz., monolateral innervation of the oculomotor nerve. The patient has complete bilateral ptosis. In spite of this he is able in varying degree to lift the right upper lid sufficiently to see with the right eye, but not through innervation of the levator palpebræ superioris, but by drawing up the right eyebrow and therewith the lid. If the eyebrow be fixed by pressure of the finger at the edge of the orbit, the right lid hangs as limp and smooth as the left. Mauthner first called attention to this symptom in cases of ptosis of longer duration after he had himself acquired complete ptosis on the right side through a trauma. He was able to innervate the right half of the occipitofrontalis alone, and thus to raise the lid. After recovery the power of such innervation was again lost. It is noteworthy in the case here reported that he raises only the right eyebrow, although he is affected with double ptosis. This, however, is very advantageous for him, since double images would at once appear in consequence of the strong divergence of the eye if both lids were raised. It is an interesting circumstance that the patient is unable to maintain monolateral innervation of the facial if the left lid is passively lifted. It shows plainly that the double images thus arising inhibit the subconscious purpose of raising the lid. Mauthner had already observed in himself that the monocular innervation was not under the control of his will, but followed as soon as he

opened the left eye (the ptosis was on the right side), although its continuance was unpleasant.

For the comprehension of the phenomenon two facts recently discussed may be brought to mind: Bell's phenomenon (lifting of the eyeball during energetic contraction of the orbicularis) and the orbicularis reaction of the pupil; whereas in both of these cases an overflow of a strong nerve impulse manifestly takes place from the branches of the facial to those of the oculomotor, the opposite occurs in Mauthner's phenomenon. The (palsied) levator palpebrarum is to be innervated. As this does not react, the innervation is strengthened as much as possible until it overflows upon the facial of the forehead. The monolateral innervation is not affected on the left side, probably because the right eye was the one which became diseased last. The anatomical basis of the phenomenon may be most easily understood upon the assumption (still *sub judice*) which Mendel has made from his observation upon animals, that the ocular facialis (frontal and orbicular branch) has its nucleus in the posterior portion of the region of the oculomotor nucleus.

[NOTE. Following Remak's suggestion, electrical excitation of the levator palpebræ superioris was tried, but without result, because the irritation occasioned reflex closure of the lids, which concealed any contraction of the levator which may have existed. The term "monolateral" innervation of the frontalis is moreover not quite correct for the case reported. The muscle is innervated bilaterally, but more strongly on the right side, especially so in its temporal portions, so that the eyebrow with the upper lid is only lifted on the right side.—ED.]

DERMATOLOGY.

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Remarkably Sudden and Complete Loss of Beard and Hair of Scalp, followed by Improved Vision.—J. R. CLARKE, of Marion, Kentucky (*American Practitioner and News*, July 15, 1901), reports the case of a man, aged eighty-six years, of fine constitution, and with a history of almost uninterrupted good health until ten years ago, when he was attacked with hæmoptysis, which continued frequently until one year ago; he was often expected to die from exhaustion following the great loss of blood, but at no time were there any pyrexic symptoms nor complications. He arose one morning feeling as well as usual, and after washing his face and combing

his hair, ate breakfast, went into the sitting-room, began reading, and became so interested that when his wife asked him to get ready for dinner he was much surprised, as he did not think it possible for the time to pass so rapidly. He went to the mirror to comb his hair and beard, the latter being thick and long, covering the upper portion of his chest. Finding the beard somewhat tangled, he parted it with the fingers. He dined as usual, not thinking of the beard, until his wife inquired what ailed his beard; he replied, "Nothing," but on grasping it in his hand, to his astonishment, it parted without sensation from his face, and he held it in his hand. Going to the mirror he found that the hair was everywhere else loose and falling, including the scalp, and by simply rubbing with the hand it all suddenly and easily came out. In a few days all the hair had disappeared from the entire surface of the body. A short time after losing the hair, the eyesight began to improve very remarkably, there was no more hæmoptysis, and the general health also improved in a marked degree.

[Lest some reader possibly may be disposed to discredit the accuracy of this history, it may be stated that similar cases, *as regards the sudden falling of the hair*, have from time to time been recorded. The improved state of the eyesight following the loss of hair is a most interesting observation, and serves as a valuable lesson, demonstrating the important relation of one part of the general economy to another in many obscure pathological conditions.—EDS.]

Pigmentation of the Skin Caused by the Demodex Folliculorum.—DUBREUILH (*Journal de Mèdecine de Bordeaux*, 1901, No. 4) calls attention to the fact that the demodex, while usually a harmless occupant of the follicles, when it exists in great number, may give rise to abnormal pigmentation, as shown in the following case under his observation: A woman, aged forty years, brunette, had noticed for several years a fawn-colored discoloration around the mouth extending along the border of the jaws from one angle to the other. This discoloration was not accompanied by itching or inflammation. Upon close inspection the skin was found to be slightly wrinkled and roughened. Similar but less marked pigmentation existed upon the lateral and anterior parts of the neck and upon the chest. Upon examining scrapings from the affected parts with the microscope the demodex was found in extraordinary abundance. The author refers to similar cases observed by Amicis and Majocchi.

The Etiology of Lupus Erythematosus.—POOR (*Dermatologische Zeitschrift*, April, 1901) considers at length the principal arguments urged in favor of the tuberculous origin of lupus erythematosus. He does not find, as has been asserted by other authors, that this affection occurs most frequently in those the subjects of tuberculosis or with a distinct tuberculous family history. The local and general reaction which follows tuberculin injections in lupus erythematosus only occurs irregularly, and cannot be regarded as certain evidence of its tuberculous nature. The presence of giant cells cannot be regarded as proof of the tuberculous character of the disease, since these are found in other diseases which are in no way related to tuberculosis. The occurrence of forms transitional between lupus vulgaris and lupus ery-

thematosus may be explained by supposing that the existence of the latter malady lowers the natural powers of resistance of the tissues and prepares the way for the invasion of the tubercle bacillus so that there is in these cases a combination of two diseases. From the foregoing the author concludes that lupus erythematosus can be attributed neither to the direct invasion of the tubercle bacillus, nor to the remote effects of the toxins produced by this bacillus. It probably does not have a uniform etiology, but is produced by different kinds and degrees of peripheral and central irritations acting upon the variously reacting skin of the individual.

Is Alopecia Areata (*La Pelade*) **Contagious?**—M. CRUYL (*La Clinique*, April 27, 1901) reports that among thirty cases observed within a brief period by him there were no instances in which contagion could be traced. He does not think that the existence of this disease in the form of an epidemic has been proved, notwithstanding that instances in which it occurs in barracks are well known. This fact may be explained in other ways.

[It would seem that this disease is common in Belgium, thirty cases having been observed among the working class at the Civil Hospital at Ghent in the course of a few months.—EDS.]

Purpura following a General Gonorrhœal Infection.—WEISZ (*Archiv für Dermatologie und Syphilis*, Bd. lvii., Heft 1 u. 2, 1901) reports the case of a man, aged twenty-four years, who, in a second attack of gonorrhœa with general symptoms, such as fever and marked psychical disturbance, with suicidal tendencies, had on both lower extremities numerous hemorrhagic macules. This purpuric eruption the author believes was due to the formation of emboli by the gonococci or to the toxins produced by this microorganism. With the spontaneous cure of the gonorrhœa the purpura disappeared.

Lupus Carcinoma.—ASHIHARA (*Archiv für Dermatologie und Syphilis*, Bd. lvii., Heft 1 u. 2, 1901) reports three cases of lupus of the face associated with carcinoma. From a study of his own cases and 122 others reported by various observers, he is of the opinion that the variety of the lupus does not influence the occurrence of carcinoma, since in no instance did the preceding lupus present any special features. The course of lupus carcinoma differs from that of ordinary carcinoma of the skin in several particulars; it occurs at a comparatively early age; it advances very rapidly, the tuberculous infiltrate seeming to afford a very favorable soil for atypical epithelial proliferation, and recurrences are common after removal. Metastases are comparatively rare. The prognosis of this variety of carcinoma is very unfavorable. Although the various caustics may be employed with temporary benefit, operative interference is the most rational method of treating the malady.

Nodular Tuberculosis of the Prepuce.—SABRAZÈS and MURATEL (*La Semaine Médicale*, September 18, 1901) reports a hitherto undescribed form of tuberculosis of the penis. A man, aged twenty-six years, with tuberculosis of the lungs, kidneys, prostate, epididymis, and urethra, had upon the

anterior surface of the penis in its lower third a node the size and shape of an olive. This tumor was of fibrous consistence, painless, and attached only to the prepuce. A second node developed upon the scrotum, which suppurated and left a cicatrix with irregular borders. Histological examination showed a tuberculous structure and tubercle bacilli. The authors believe that the tuberculosis was propagated by way of the lymphatics.

The Contagiousness of Erythema Nodosum.—MOUSSOUS (*Archives de Médecine des Enfants*, July, 1901) has observed on two different occasions in his service erythema nodosum develop some days after a child has been admitted with this affection in the patient in the neighboring bed. He believes these cases can only be explained by contagion, and concludes that erythema nodosum is not a form of polymorphous erythema, but a specific affection.

The Etiology and Pathogeny of Sclerema Neonatorum.—COMBA (*La Clinica medica Italiana*, May, 1901; *Annales de Dermatologie et de Syphiligraphie*, October, 1901) reports two cases of sclerema neonatorum. In the first case the infant was born at term, fairly well developed; the autopsy showed a generalized infection with the bacillus of Friedländer, which had taken place through the umbilicus, the pus in the umbilical wound containing this micro-organism, and the right umbilical artery being inflamed There was also a bronchopneumonia and an acute nephritis due to the same infection. In the second case the bacillus of Friedländer was also found, associated with the streptococcus. Infection probably occurred through the respiratory mucous membrane. Comba states that in all cases of sclerema there is a septicæmia the development of which is favored by the feebleness of the infant or by a local infection of some important organ. The micro-organisms or their toxins produce such a disturbance of the centres regulating thermogenesis that the temperature falls, and induration of the subcutaneous adipose tissue follows. The author does not think that sclerema neonatorum is a special nosological type; it should be considered as the result of an acute nephritis and of circulatory troubles secondary to an infectious process.

Goosegrease as an Excipient in Ringworm of Scalp.—G. T. JACKSON (*Journal of Cutaneous and Genito-Urinary Diseases*, June, 1901) refers to the value of this substance as an excipient in the treatment of ringworm of the tinea tonsurans. There is much goosegrease in the market that is not genuine, the best quality being very costly, for the reason that it is the fat taken from the dead but uncooked goose, a few ounces of fat costing as much as the whole goose. That employed by the author is made by the Schiefflin Company. For tinea tonsurans an ointment is made of ʒss to ʒj of the crystals of iodine to ℥j of goosegrease, to be worked into diseased areas by means of a stencil or stiff paint brush. It is also useful in tinea sycosis.

Blue Pigmentation following Injections of Morphine.—THIBIERGE (*Annales de Dermatologie et de Syphiligraphie*, Nos. 8 and 9, 1901), at a seance of the Société Médicale des Hôpitaux de Paris, presented a woman, aged

forty years, addicted to the use of morphine from the age of sixteen, in whom pale, bluish spots, similar to those produced by tattooing with Indian-ink, symmetrically distributed over the thigh, had followed injections of morphine. These spots were rounded or elongated, 2 to 3 millimetres in diameter, with a slight cicatricial depression. Histological examination of the spots showed the presence of black grains of unequal size, insoluble in alcohol, potash, and concentrated acids, and not giving the reaction for iron, and others transparent and refractive, with sharp corners. The first seemed to be particles of carbon, the others, particles of silica.

Eczema Produced by Formalin.—FISHER (*British Journal of Dermatology*, August, 1901), in a clinical note records his experience of the irritating effects of formalin upon the skin. He was accustomed to use this antiseptic in the preparation of museum specimens, more especially in the winter; and during several successive winters he suffered from an eczema of the fingers, which was at first attributed to the frequent wetting of the hands, but was subsequently found to be due to the use of formalin. Others who worked with him were similarly affected. Susceptibility to the irritant effects of formalin seems to be more or less gradually acquired. For a time the hands may be daily dipped into formalin solutions varying in strength from 1 to 5 per cent. without ill effects; then itching and vesicles begin to appear, which result in troublesome eczema if the use of the formalin is not immediately given up. The susceptibility of the skin is much increased after such an attack, mere handling of specimens preserved in formalin being sufficient to cause a return of the eczema.

The Histopathology of Two Cases of Cutaneous Tuberculides, in One of which Tubercle Bacilli were Found.—MACLEOD and ORMSBY (*British Journal of Dermatology*, October, 1901) examined the lesions from two cases of cutaneous tuberculides. These lesions were acne-like, bluish-red nodules, situated in the one case on the extensor aspect of both legs below the knees, in the other upon the forearms, hips, thighs, and legs. The histological appearances found were as follows: In both cases the initial changes appeared to be in the hypoderm, and consisted of proliferative changes in and cellular hyperplasia around the veins in that region. In both the cellular infiltration rapidly encroached upon and replaced the fat tissue, forming cellular areas more or less encapsulated by the remains of the interlobar septa. It is this early cellular infiltration which is to a large extent confined to the hypoderm, which gives rise to the deep-seated nodules which are scarcely visible clinically, but are usually appreciable to the touch. In both the cellular infiltration extended upward along the capillaries, forming foci in the neighborhood of the sweat-coils, hair-follicles, and sebaceous glands, and finally reached the papillary layer. In both the character of the cellular hyperplasia was similar. In the hypoderm it was more markedly tuberculous in appearance in the second than in the first case, but in both the foci in the corium presented equally the characteristic tuberculous architecture. Tubercle bacilli were found in the giant cell in the latter case. A fibrous stroma supporting the cellular hyperplasia was either entirely absent or was represented by œdematous, degenerated collagen and

elastin. In both cases the cellular hyperplasia developed at the expense of the tissue in the neighborhood and finally became necrotic. The papillary and the subpapillary vessels were congested as soon as the infiltration began to encroach upon the corium, accounting for the congested appearance which the nodules presented clinically. The epidermis was only secondarily affected.

The two cases clinically and histologically had certain marked features in common. In the second case there was a dactylitis and a tuberculous family history; tubercle bacilli were found in the lesions of this case. Although no bacilli were found in the lesions from the first case the similarity of the histological appearances left little doubt in the minds of the authors that it was also tuberculous.

[This report is of extreme interest, furnishing indubitable evidence of the tuberculous nature of these lesions.—M. B. H.]

HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF

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Influence of Boric Acid and Borax upon the General Metabolism of Children.—Boric acid and borax are much used as food preservatives, and the question of their influence upon the general nutrition of the consumer is one of great interest. The literature on the subject is very voluminous, but the conclusions drawn by the investigators are most conflicting. In order to obtain reliable data upon which to base conclusions, DRS. F. W. TUNNICLIFFE and OTTO ROSENHEIM (*Journal of Hygiene*, April, 1901, p. 168) conducted a series of comparative metabolic observations on the human subject, extending over a considerable period. The observations were made upon three children, who were kept under constant supervision. Their ingesta were accurately weighed and their excreta were collected daily without loss. Both ingesta and excreta were carefully analyzed by the most approved methods. The results of the very numerous analyses are given in detail. The general conclusions arrived at may be summarized as follows: Boric acid in small doses up to 1 gramme per diem, continued for some time, exerts no influence upon proteid or phosphorus metabolism, has no effect upon the assimilation of fat, and exerts no inhibitory effect upon intestinal putrefaction. Body-weight increases. The quantity of dry feces is not affected, but their nitrogen and phosphorus percentage is slightly decreased. Borax in continued doses of 1.5 gramme has no influence upon proteid or phosphorus metabolism, may or may not improve fat assimilation, does not interfere with increase in weight, has no effect upon the weight of dry feces

and their nitrogen and phosphorus percentage, and tends to increase intestinal putrefaction. Both boric acid and borax are quickly eliminated, hence cumulative action is improbable. Neither substance will affect the general health and well-being.

Purification of Water by Sodium Bisulphate.—Tabloids of sodium bisulphate have recently been recommended by Drs. Parkes and Rideal for the treatment of water by armies in the field. Three tabloids are dissolved in each pint of water, and fifteen minutes' contact allowed before drinking. They state that B. typhosus is killed by only five minutes' contact with the agent in the proportion of 15.5 grains to the pint, but recommend fifteen minutes to insure sterility. The process has been tested by DR. A. WARNER (*Public Health*, July, 1901, p. 700), who found that a contact of fifteen minutes causes a striking reduction in the number of typhoid bacteria in an infected water, but does not produce sterility. In a majority of cases the bacillus is completely destroyed by a contact of thirty minutes. B. enteritidis is as resistant as B. typhosus, and B. coli communis still more so. B. choleræ is destroyed in ten minutes. It has been claimed that the tabloids impart an agreeable acid taste and materially aid in quenching thirst, but Warner asserts that to some the taste is unpleasant and would probably soon become irksome. A soldier drinking five pints of water in a day would swallow over seventy-five grains of the salt, an amount which, Warner suggests, would have the effect of increasing thirst rather than of quenching it.

A New Test for Formaldehyde in Milk.—In the process of estimating nitrogen by the Kjeldahl-Gunning method in a number of samples of milk which had been preserved with formalin, A. G. LUEBERT (*Journal of the American Chemical Society*, September, 1901, p. 682) noticed a peculiar violet coloration of the potassium sulphate crystals and of the sulphuric acid surrounding them. This was especially marked when the milk was added to the potassium sulphate and the acid carefully poured down the side of the digestion flask so that the liquids did not mix, and did not occur with milk which contained none of the preservative. He recommends the following test: Five grammes of coarsely powdered potassium sulphate are placed in a 100 c.c. flask, 5 c.c. of the suspected milk are distributed over it by means of a pipette, and 10 c.c. of sulphuric acid (specific gravity 1.84) carefully poured down the side of the flask. The whole is now allowed to stand quietly until the color develops. If formaldehyde is present, the violet coloration occurs in a few minutes; if none is present, the liquid will at once assume a brown color, rapidly changing to black. The test is said to reveal the presence of one part of formaldehyde in 250,000 of milk.

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